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A MANUFACTURING GEOGRAPHY OF EDMONTON, ALBERTA

by

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A THESIS

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ABSTRACT

This thesis is a study in the geography of manufacturing. It is an attempt to understand the manufacturing complex of Edmonton, a city in which manufacturing only plays a moderate role in the total geography.

Emphasis is placed on the areal variations in manufacturing found within the urban area. The understanding of these variations is attempted by means of a division of the city into five manufacturing districts. These districts are delimited not by any one characteristic but by the overall interrelationships between the various factories within them.

Consideration is also given to the genesis and external relationships of the manufacturing industry found in Edmonton - the relationship of manufacturing in Edmonton to the total geography of Canada. This is attempted by means of a comparison of the manufacturing structure of the city with that of Canada as a whole.

It is found that as in most cities the type of manufacturing varies areally through the city. A number of industrial complexes have arisen with associations between the various factories which constitute them. It is also found that manufacturing in Edmonton is mainly concerned to supply the local market, Northern Alberta, and that very few products are "exported" beyond the provincial boundary.

The local orientation of manufacturing imposes certain characteristics on manufacturing and the form of the manufacturing districts.

The future development of manufacturing appears to be intimately connected with the growth of this local market. At the same time the overall growth of manufacturing may make the city a more attractive location for enterprises wishing to serve a wider market.

ACKNOWLEDGEMENTS

A number of people and organizations have greatly aided the preparation of this thesis. Specifically, I would like to thank the staffs of the Edmonton District Planning Commission, the City of Edmonton Planning Department and the Edmonton Area Industrial Development Association for their co-operation in many aspects of this study.

I would also like to thank all those Edmonton businessmen who patiently answered my queries into aspects of their operations with which they are not normally concerned.

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INTRODUCTION

Manufacturing in Canada is highly concentrated in Ontario and Quebec. It is more concentrated even than this would suggest in a limited area in the southern parts of these two provinces, the Canadian extension of the North American Manufacturing Belt.[1] Over eighty per cent of the manufacturing labour force of Canada is in these two provinces. In many types of manufacturing industries almost the whole of the development in Canada is found here. These include motor vehicle, heavy electrical machinery, cigarette and tobacco manufacturing.[2] In an even larger number of industries over two-thirds of the activity is in the two provinces. Such a concentration means that manufacturing in the rest of the country is oriented towards supplying mainly the local market or towards exploiting some local resource, mineral or agricultural.

In recent years there has, however, been an increase in the proportion of Canadian manufacturing performed in the Prairie Provinces. This has been due partially to the discovery and exploitation of the oil and gas resources, primarily in Alberta, and also, to the increasing population of the prairies. Both of these factors have had their heaviest impact on Alberta.

Within Alberta, in the oil and gas industry, there has been some specialization in functions between Edmonton and Calgary. The oil company offices tend to be in the latter city; the largest refineries and the

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[1] R. Hartsthorne, "A New Map of Manufacturing in North America," Econ. Geogr., Vol. 12, 1936, p. 45.

[2] Canada, Dominion Bureau of Statistics, General Review of the Manufacturing Industries of Canada, 1959, p. 132-134.

petrochemical plants are found in Edmonton. In turn this industry has attracted other manufacturing to make Edmonton the more significant manufacturing centre of the two.

The rapid growth in Edmonton's population induced by the development of oil and gas has begun to slow down although the rate of growth is still very high. The city has now become a more stable if still a rapidly growing community. The first effects of the oil boom are over and the city has reached some form of plateau in economic development, particularly in manufacturing.[3] This is then an appropriate time to attempt a study of manufacturing in Edmonton.

THE STUDY

This is a study in the geography of manufacturing. It is concerned with an analysis of manufacturing and its environment within the city as a whole and with the variations of manufacturing inside the metropolitan area. Consideration of the external relations of manufacturing, and a comparison of the structure of manufacturing in Edmonton with Canada, as a whole, is also undertaken.

Interest in Edmonton as a manufacturing centre has been stimulated by the rapid changes in the city's fortunes during its rather chequered history. It can be claimed that until the 1950s Edmonton had always been very much a boom or bust town. Since the development of the oil and gas industry its future has appeared secure, as this has widened the economic

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[3] No major firm connected with the oil or chemical industry has been established in the Edmonton area since 1956 with the exception of the factories connected with the Sherritt Gordon nickel refinery at Fort Saskatchewan. These plants process the by-products of the nickel refining process to produce various chemicals.

base of the city. Before the discovery of oil locally, the city's economy was very much subject to the fluctuations in the agricultural economy.[4]

Objectives of the Study

The objectives of this study are threefold:

1. To analyze the form of the types of manufacturing found in Edmonton;

2. To establish the nature and variable character of the present areal pattern of manufacturing in Edmonton;[5]

3. To examine the locational forces which have affected manufacturing industry in Edmonton;

The first objective, if the areal pattern of manufacturing is to be understood, must be the analysis of the form of manufacturing in Edmonton. The form of manufacturing industry fundamentally affects the areal pattern which is found in the city.

The second objective, the portrayal of the nature and variable character of manufacturing industry, is necessary as manufacturing industry in common with other urban activities tends to vary in its nature internally within the city. Certain industries tend to concentrate in certain parts of the city.[6] Some manufacturing industries are typically

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[4] F. Marlyn and H. N. Lash, "The Edmonton District, A City Centred Multiple Resource Region", Resources for Tomorrow Conference, Background Papers, Vol. 1, Ottawa, 1961, p. 459.

[5] Manufacturing, for the purposes of this paper, is defined as that part of industrial activity which "produces tangible goods". This is as opposed to service industries which produce services. It does not include activities such as agriculture, mining and construction which also produce tangible goods. These industries are eliminated by their methods and processes and also by the fact, that unlike manufacturing, they are not confined to factory production. The industries included within manufacturing in this study are those included in the Standard Industrial Classification Manual of the Dominion Bureau of Statistics.

[6] E. M. Hoover, The Location of Economic Activity, New York, 1948, p.128.

found downtown, some on the edge of the built-up area removed from other uses, and yet others along the main urban traffic routes. Even today many factories require rail access and this may have been the determining factor in the choice of site. This paper is an attempt to understand the varying integrations of the phenomena concerned with manufacturing industry contributing most significantly to a knowledge of the total geography of the Edmonton metropolitan area.

Finally, the industries which are found in Edmonton have been attracted by various locational forces. An analysis of these is necessary to understand both the genesis of the present manufacturing complex and the present external relationships which are moulding the complex. A knowledge of genesis and external relationships is an essential to the full explanation of the present manufacturing complex of the city, and its part in the geography of Canadian manufacturing. It is also hoped from this assessment to make some prediction of the possible trends in manufacturing in the city.

Method of Approach

This study has been divided into several sections and begins with an appraisal of Edmonton's position in Canada. An examination of the city's site and its bearing on the areal pattern of manufacturing follows. This is linked with a consideration of the relevant social and economic elements which have impinged upon the manufacturing pattern. This section is followed in Chapter 2 by the discussion of some aspects of the historical geography and the history of manufacturing.

In Chapter 3 manufacturing industry in the city is examined as a whole. An attempt is made to assess the overall manufacturing structure.

by using significant measures for the different industries, for example, persons employed and value added.

In Chapter 4, an examination of the present industrial complex, five industrial districts are delimited. These districts are used as the basis for more detailed discussion which includes the results of interviews and questionnaires addressed to persons concerned with manufacturing in each district. The different districts are discussed in terms of types of manufacturing, employment, factory site, general age of development and other related features.

Chapter 5 is an appreciation of the location of manufacturing industry in Edmonton in relation to raw materials and markets. Manufacturing industries are attracted by the local market in Edmonton and Northern Alberta, and by the raw materials found there. An assessment of the importance of these two factors in Edmonton's manufacturing is attempted.

The conclusion attempts some prediction of trends in the growth of manufacturing in the city, especially the relationship to general changes taking place in Canada.[7]

THE STUDY AREA

For the purposes of this thesis Edmonton is the metropolitan area as defined by the Dominion Bureau of Statistics at the 1961 census. The area embraces the city itself, the towns of Jasper Place and St. Albert, and parts of the counties of Sturgeon and Strathcona, including the

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[7] D. W. Slater, "Trends in Industrial Locations in Canada", Resources for Tomorrow Conference, Background Papers, Vol. 1, Ottawa, 1961, p. 412.

residential subdivision of Sherwood Park, and part of the municipality of Stony Plain (Fig. 3).

There is little manufacturing outside the city boundaries except in the County of Strathcona, but the latter is very significant and the legal city area would therefore not be a valid unit for study.[8] The town of Fort Saskatachewan, seventeen miles to the northeast, has an important group of factories but they are largely independent of the rest of the metropolitan area, so they have been omitted from the study.

It is also of value here to delimit the wider region of which Edmonton is part, "the urban field".[9] For the purposes of the study this is the northern half of the province of Alberta extending south to immediately south of Red Deer. It is the region to which Edmonton supplies the bulk of its services and production and from which it cannot be separated, in any real sense.

It is within this framework, and on this basis, that this study has been pursued. In essence it is an attempt to interpret and understand the areal pattern and variable character of manufacturing industry in Edmonton and the position of manufacturing in relation to the total geography of manufacturing in Canada.

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[8] The bulk of the petrochemical industry and all three oil refineries are along the eastern edge of the city in the County of Strathcona.

[9] A. E. Smailes, The Geography of Towns, London, 1953, p. 135,et seq.

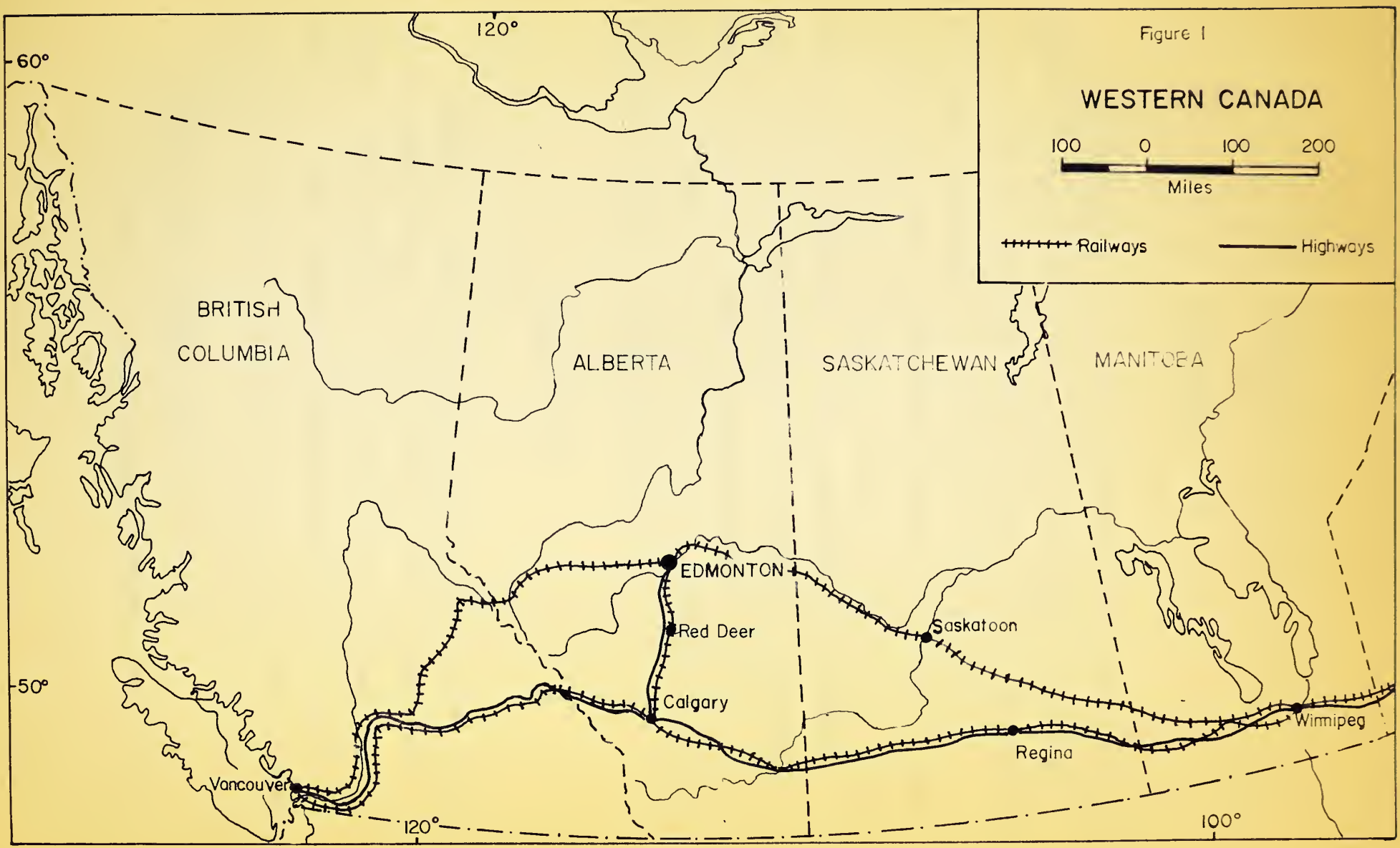
Figure 1
WESTERN CANADA
100 0 100 200
Miles
Railways
Highways
120°
60°
BRITISH
COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
EDMONTON
Red Deer
Calgary
Saskatoon
Regina
Wimipeg
Vancouver
50°
120°
100°

CHAPTER 1

THE SETTING

The development of manufacturing is one of the elements of modern civilization most removed from the natural environment, not directly related to relief, climate and similar features. Despite this situation it is still very necessary to discuss the general relationships between Edmonton and its physical and economic setting. The influence of the former directly is undeniably slight but indirectly it has been of considerable importance. Of more significance is the economic inter-relationships between Edmonton and other areas. The relations between the city, its immediately surrounding region, the rest of Alberta, and Canada as a whole, have all played their part in moulding the present structure of manufacturing industry.

PHYSICAL FEATURES

Edmonton is within the Western Prairie Region,[1] on what is called the third prairie level, the Alberta Plain or Third Prairie Plain.[2] The sole relevant factor here, is that this plain is the highest portion of the prairie plains, which slope down from the Rockies in a general northeasterly direction. The Alberta Plain is formed mainly of Cretaceous

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[1] Griffith Taylor, Canada, London, 1947, p. 159.

[2] D. F. Putnam, (ed.), Canadian Regions, Toronto, 1952, p. 344.

sediments overlain with remnants of Tertiary sediments in central Alberta.[3] In the whole of the Western Provinces physical differences are of little significance except for the divisions between the sedimentary plains and the folded and faulted cordillera in the west, and the pre-Cambrian shield in the northeast. It is in these sedimentary strata that the mineral fuels are found: oil and natural gas and coal.

The most marked regional distinctions are based on changes in climate, and closely associated vegetation. Edmonton lies in the parkland belt, "a fertile grassland dotted with so-called bluffs and patches of woodland"[4]. This area is more humid than the true prairie grasslands to the south and southeast. The mean rainfall at Edmonton is 17.6 inches and there is an average frostfree period of between eighty and ninety days. The greater humidity of the climate, with a lower evaporation rate than to the south, has led to the growth of a thicker vegetation cover. This in turn has contributed to the rich black soils, the most fertile in the province.

Local Surface Configuration

The Edmonton area has a subdued relief. There are no variations of significance to the economic geographer, and there are few barriers to settlement or transport. The actual site of the city, on an old lake bed, is relatively flat. Through these soft deposits and the

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[3] Ibid., p. 341.

[4] Griffith Taylor, op.cit., p. 163.

underlying sandstone the North Saskatchewan River has cut a valley some two hundred feet deep inside the city limits. The width of the valley varies from one half, to one and a half miles. This apart there is little else to deter the use of most of the city's area for industrial sites. The river valley acts as a barrier to urban uses and has largely been left as open space inside the city boundaries. During the early settlement, parts of the very restricted valley floor were occupied by a few manufacturing concerns, especially those connected with the river in some way, either boatbuilders or lumbermills. The problem of flooding, although of only limited significance in recent years, led to the abandonment of these early sites and today the valley is occupied by a few relict residential areas, city utilities and a series of parks and other recreational areas.

The river valley also supported, until recently, one of the major concentrations of coal-mining in the city. A large part of the city is underlain by coal and the seams outcrop at various points along the valley sides. The most highly developed seams were at Clover Bar and in the valley of White Mud Creek. Coal-mining was an important aspect of the urban scene until the mid-fifties although it only supplied the domestic market and the power station. Until 1959 more than 190 coal-mines had been registered in the city[5] but at the time of writing only one remains in production, the Red Hot Coal Mine, in the valley of White Mud Creek.

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[5] W. C Wonders, "River Valley City - Edmonton on the North Saskatchewan", Cdn. Geogr., No: 14, 1959, p. 8.

Water Supply and Drainage

The main city water supply is from the North Saskatchewan River, the only river in the immediate vicinity of the city. It has no tributaries other than small creeks whose ravines make excellent recreational sites and one means of ascending the steep valley sides. The river is also the only drainage system although there are some minor internal drainage systems connected with shallow, often impermanent, lakes. The major drainage trend is from the southwest to the northeast, following the direction of flow of the North Saskatchewan.

The river both supplies water for the city and removes sewage. As might be expected this double use creates problems both locally and downstream; the North Saskatchewan is the major source of water for settlements as far downstream as Prince Albert in northern Saskatchewan. The water problem is aggravated by the fact that many of the industries in the city are very large water users, especially for cooling purposes. The double function of the river is complicated by the low minimum flows and the freezing of the river during the winter. The river is normally frozen from the end of November until the middle of April and the ice may obtain a maximum thickness of between twenty and thirty inches.[6]

Low winter flows, (Table I) cause a pollution problem and the only satisfactory solution is to increase winter flows. This has been achieved sufficiently for the immediate future by the construction of the Brazeau

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[6] Ibid., p. 3.

Dam. The dam raised the minimum flows by 500 cubic feet a second in 1962 and by 1,000 cubic feet in 1963; in future the minimum flows at Edmonton should never be less than 1,500 c.f.s. The low minimum flows made it difficult to maintain a sufficiently low pollution level during the winter. This first became a nuisance in the autumn of 1953.[7] Joint efforts by the city, the provincial authorities and the industries concerned brought the problem under control. This was done largely through the construction of secondary sewage treatment

TABLE I - RECORDED FLOWS OF THE NORTH SASKATCHEWAN, AT EDMONTON, 1947-1956

Year	Flows in cubic feet per second		
	Maximum	Minimum	Mean
1947	28,600	602	7,260
1948	65,440	1,140	11,260
1949	32,680	730	5,170
1950	50,350	430	6,470
1951	39,020	624	7,420
1952	109,700	1,030	9,440
1953	44,900	652	8,659
1954	106,600	833	12,170
1955	30,380	1,040	7,814
1956	25,640	580	6,288

Source: Edmonton District Planning Commission, Edmonton District Water Supply, Edmonton, 1959.

[7] P. H. Bouthillier and H. L. Hogge, "Sream Pollution and Its Control in Alberta", Engineering Journal, Vol. 43, No: 6, June, 1960, p. 59.

facilities by the city and primary treatment of effluent by the packing plants and oil companies.[8]

Pollution has caused difficulties with the city water supply but major shortcomings are also connected with the capacity and position of the Water Treatment plant. The plant is situated on the north side of the river, near the 105th Street Bridge, at almost the centre of urban development. The addition of materials to the river upstream of the plant has to be very strictly controlled.

TABLE II - PEAK DAILY WATER DEMAND (millions of Imperial gallons)

Year	Peak Demand	Water Treatment Plant Capacity	Average Demand
1947	18.7	10	9.2
1951	28.0	25	12.3
1953	33.6	25	14.3
1955	38.7	25	17.2
1956	43.5	25	19.2
1957	51.2	40*	21.2
1958	64.0	40	22.2

Source: Edmonton District Planning Commission, The Edmonton District Water Supply, Edmonton, 1959.

* Maximum capacity 60 million gallons during the summer.

[8] Later, pollution had to be checked by means of a compressed air blower, built in 1956. The blower re-aerates the water under the ice cover when the oxygen content is reduced by the necessity to absorb waste, particularly phenols, Bouthillier and Hogge, op.cit., p. 61.

More significant, however, is the problem of meeting peak demands. Even in 1959 the Water Treatment plant was not capable of meeting the then peak consumption. There is a constant need to increase the storage capacity which was 16,250,000 gallons in 1959. A comparison between the increase in peak and average demand, (Table II) shows that the former is increasing much faster than the latter. This situation is likely to raise the costs of water supply. It is estimated that by 1978 the metropolitan population will be about 570,000 and because there are few alternative water sources to the North Saskatchewan[9] further problems will be raised. The possibility of using the Pembina River and Pigeon Lake have already been investigated. The question of water supply is likely to remain of considerable significance to the growth of Edmonton in everyway, especially to its manufacturing industry.

ECONOMIC SETTING

Edmonton claims to be the most northerly city in North America, the only cities further north are in Alaska, and it is the most northerly city of its size. This location has disadvantages although there are compensations to be gained from being, as it is called, the "Gateway to the North".

The city dominates the northern half of Alberta and associated areas in the North West Territories and British Columbia. Its metropolitan

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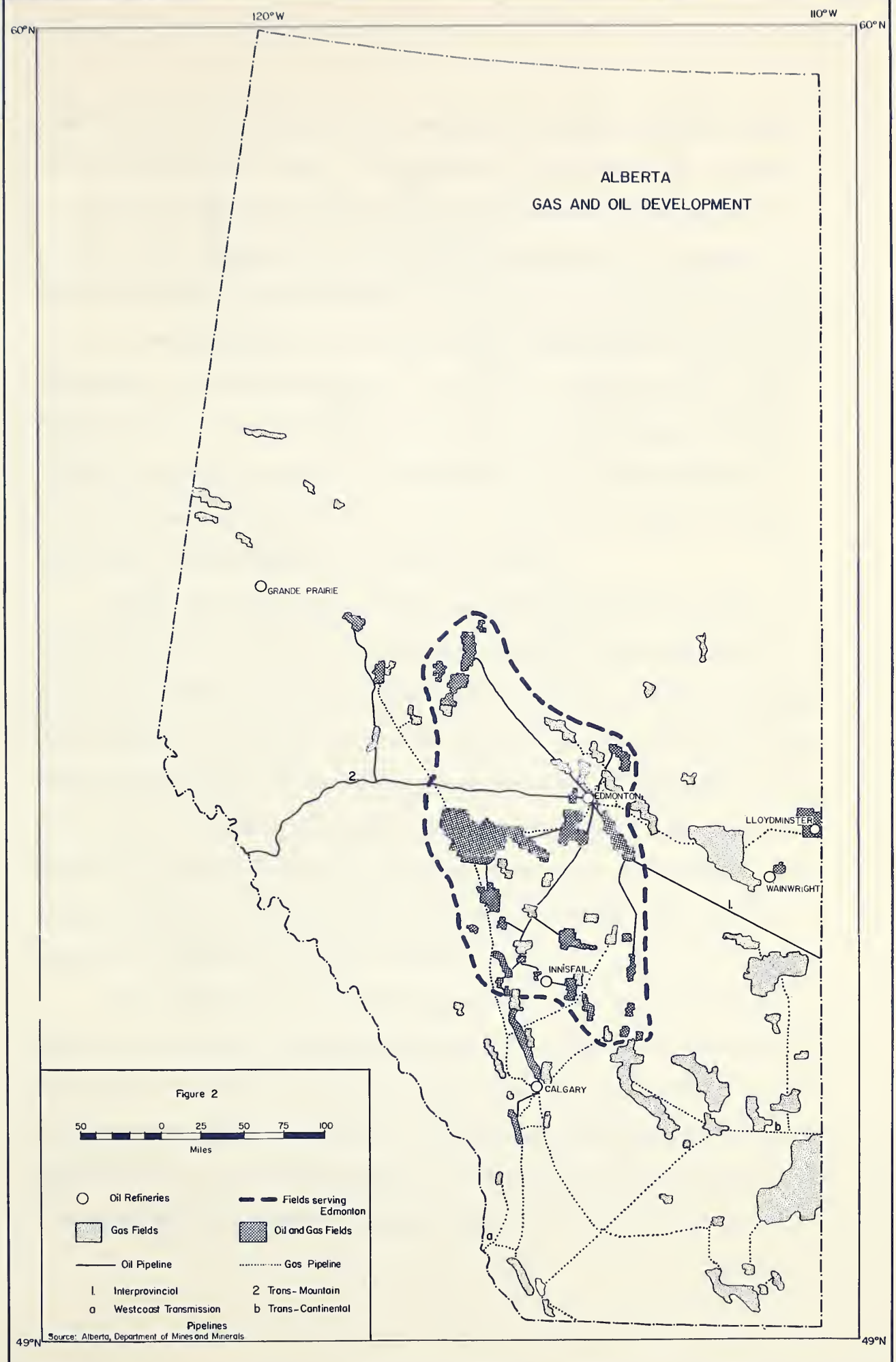
[9] Edmonton District Planning Commission, The Edmonton District Water Supply, Edmonton, 1959, p. 44.


120°W
110°W
60°N
60°N
ALBERTA
GAS AND OIL DEVELOPMENT
GRANDE PRAIRIE
EDMONTON
LLOYDMINSTER
WAINWRIGHT
INNISFAIL
CALGARY
2
1
a
b
Figure 2
50 0 25 50 75 100
Miles
Oil Refineries
Fields serving Edmonton
Gas Fields
Oil and Gas Fields
Oil Pipeline
Gas Pipeline
1 Interprovincial
2 Trans-Mountain
a Westcoast Transmission
b Trans-Continental
Pipelines
Source: Alberta, Department of Mines and Minerals
49°N
49°N

functions are in competition with Calgary to provide central services to the province as a whole. The boundary of the spheres of influence of the two cities lies in the vicinity of Red Deer. Edmonton is the centre of the communication network which focusses on the Canadian National Railway, the northernmost transcontinental route. In addition, it is an important centre for northern air communications, both for the government and private operators. It is these links that have given Edmonton much of its dominating position in northern Alberta and the tributary areas of the Yukon, the Mackenzie Valley and northeastern British Columbia. For the whole of this area it has become the major servicing, trans-shipment and processing centre.

These functions are the basis upon which the manufacturing relationships have been built. Edmonton has been for many years a processing centre for the livestock farming industry, shipping meat and meat products to national and foreign markets. In more recent years the manufacturing sector of the urban economy has been strengthened by the rise of the oil processing industries. The most significant of these is not oil refining, which is orientated towards the local market, as defined above, but petrochemicals which supply raw and semi-finished chemicals to markets in Central Canada.

The exploration and processing sectors of the oil industry have become concentrated in Edmonton because of its nearness to the major oilfields. The largest fields all lie within thirty miles of the city and pipe their oil to it (Fig. 2). Edmonton is connected by pipeline to eighty per cent of the oil reserves in Alberta (Table III) although a large proportion of the oil actually piped to the city is later

transhipped by means of the Trans-Mountain and Interprovincial pipelines (Fig. 2).

TABLE III - THE PROBABLE MARKET DISTRIBUTION OF OIL RESERVES IN ALBERTA

Probable Market	Original Reserves[1] of Connected Fields (thousand bbls.)	Percentage of Total Oil Reserves
Edmonton	3,933,500	88.2
Calgary	263,900	5.9
Trans-Mountain Pipeline[2]	214,700	4.8
Interprovincial Pipeline[2]	22,800	0.5
Lloydminster	14,000	0.3
Wainwright	8,500	0.2
Grande Prairie	6,200	0.1
Total Alberta Oil Reserves, 1962	4,463,600	100.0

[1] The estimated total reserves of a field before exploitation.

[2] Connected directly to the pipeline without first going to an intermediate collection centre.

Sources of Data: Alberta, Society of Petroleum Geologists, Oilfields of Alberta, Calgary, 1959.

Canadian Imperial Bank of Commerce, Canada, Oil and Natural Gas Development, Calgary, 1962.

The last decade has seen the expansion of the importance of Edmonton as a source of manufactured products for the whole of the Prairie Provinces. It has, by the growth of manufacturing and other functions, along with Calgary, begun to challenge the supremacy of Winnipeg in the urban hierachy of the prairies. A new pattern of economic relationships is emerging. In this Edmonton will become an

additional focus of economic life, of which the rapid increase in manufacturing is only a part (Table IV).

TABLE IV - INCREASE OF EMPLOYMENT AND FACTORY SHIPMENTS, 1949-1959

Province	Percentage increase 1949-1959	
	Factory Employees	Selling value of factory shipments
Manitoba	2.8	56.6
Saskatchewan	15.7	61.0
Alberta	49.6	138.5
All Prairie Provinces	20.2	86.2
Canada	11.3	86.8

Source: Dominion Bureau of Statistics, General Review of the Manufacturing Industries of Canada, Ottawa, 1959.

Functions of the Edmonton Metropolitan Area

In common with the majority of the other western plains cities, both in Canada and the United States, Edmonton cannot basically be classified as a manufacturing city. Some manufacturing activities, notably, meatpacking and petrochemicals, play an important part in its economic base but their role is overshadowed by the city's functions as a service and administrative centre. The latter functions are relatively old but have been strengthened during recent years. Manufacturing, especially, has grown with the expansion of the extractive oil and natural gas industry in the region around the city.

The relative importance of the various functions of the city can be seen from the number of "surplus" workers in each major economic group (Table V).[10]

[10] The concept of "Surplus" workers has been developed in economic base

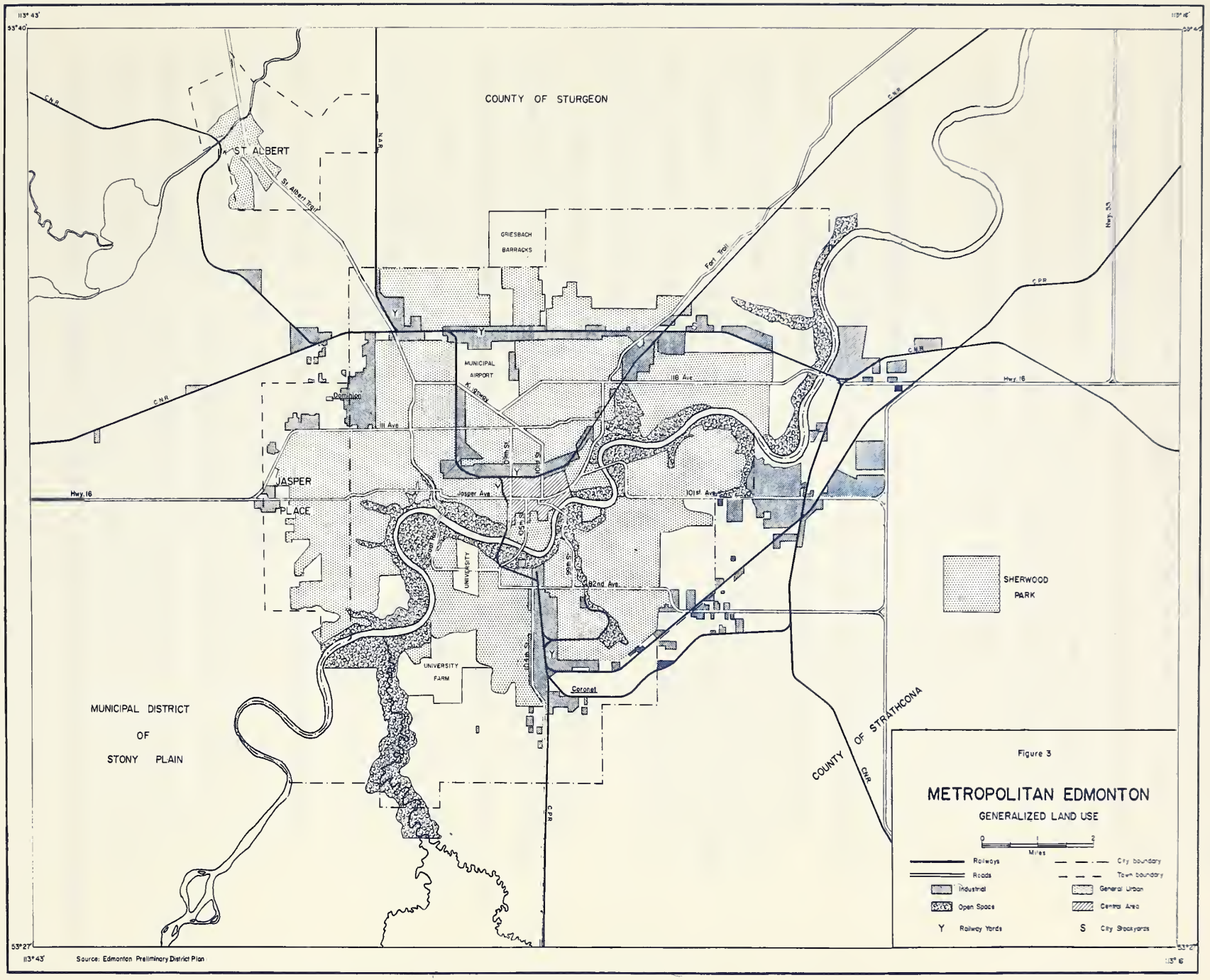
Although these figures were taken from the 1951 census, the changes since then, important as they are, have not entirely destroyed their validity. The most important change during the last decade has been the increase in the share of manufacturing, until it employs almost one-fifth of the working force.

TABLE V - "SURPLUS" WORKERS IN EACH MAJOR INDUSTRIAL GROUP, EDMONTON METROPOLITAN AREA, 1951

Industrial Group	Number of "Surplus" Workers	Percent of all "Surplus" Workers
Mining and Quarrying	1,805	6.0
Construction	4,349	16.0
Manufacturing	3,342	12.0
Transportation, Storage and Communications	2,446	9.0
Electricity, Gas and Water Supply	310	1.0
Retail and Wholesale Trade	6,991	25.0
Community, Business and Personal Service	7,821	28.0
Finance, Insurance and Real Estate	771	3.0
Total, all industrial groups	27,907	100.0

Source: Adapted from Edmonton District Planning Commission, Economic Base Survey for the Edmonton Metropolitan Area, Edmonton, 1958.

theory to denote that part of the labour force employed in the basic activities. Basic activities are those which "export" their products or services outside the immediate city area. These workers are, therefore, surplus to the needs of the immediate city area. They contrast with the non-basic activities which serve the city population only. J. W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions", Econ. Geogr., Vol. 30, No. 3, July, 1954, pp. 246-261, reprinted in H. M. Mayer and C. F. Kohn, (Ed.), Readings in Urban Geography, Chicago, 1959, p. 92.


COUNTY OF STURGEON
ST. ALBERT
St. Albert Trail
GRIESBACH BARRACKS
Fort Trail
MUNICIPAL AIRPORT
St. Albert
Dominion
111 Ave
118 Ave
Hwy. 16
Hwy. 33
JASPER PLACE
Jasper Ave
101st Ave
92nd Ave
Groat Rd
UNIVERSITY
UNIVERSITY FARM
Coronet
SHERWOOD PARK
MUNICIPAL DISTRICT OF STONY PLAIN
COUNTY OF STRATHCONA
C.N.R.
C.P.R.
N.A.R.
Figure 3
METROPOLITAN EDMONTON
GENERALIZED LAND USE
0 1 2
Miles
Railways
Roads
Industrial
Open Space
Y Railway Yards
City boundary
Town boundary
General Urban
Central Area
S City Stockyards
113° 43'
53° 40'
53° 27'
Source: Edmonton Preliminary District Plan

The services and trade groups alone employed over half the total surplus workers in 1951 and this domination has continued despite the increasing role of Edmonton as a centre for manufacturing, especially in the more primary stages. Its function remains one of a regional centre and not a manufacturing city. Manufacturing is only one and by no means the most important of the city's activities.

The Urban Land Use Pattern

The most striking characteristic features of the land use pattern in the city are the general low density of development and the broad swath of open land occupied by the river valley, in the centre of the urban area. The area of the city, in August, 1961, was some fifty-eight square miles, of which forty-three square miles was classified as developed, by the city planning department.

The areal pattern of land use reflects the growth of the city. The most significant nucleii from which the present pattern has evolved were the two original settlements, Edmonton and Strathcona. It is possible to identify other centres of urban growth, particularly in the northeast around the meatpacking complex.

There is more urban development on the north side than on the south side of the river although the imbalance has been considerably lessened during the last decade. The central business district is entirely on the north side (Fig. 3) and this shows within itself an emerging sub-pattern of specialization. To the east of 109th Street, there is an area largely given over to government uses and along Jasper Avenue an increasing separation between the main retail shopping and commercial

districts. The centre of the city is flanked to the east, beyond 101st Street, by an area of mixed land uses: commercial, industrial and residential. This is one of the older parts of the city and the most likely scene of an urban renewal project. In the north and west the centre is bordered by wholesale and industrial districts which have grown up around the main railway lines (Fig. 3). Beyond this, but south of the municipal airport, are the older residential districts and a few newer ones which have filled in the gaps produced by the earlier scattered evolution of the city. The major residential districts are in the west of the city and around the municipal airport and lower value areas to the east and northeast including Beverly. The extreme northeastern and northwestern areas are occupied by industrial districts sited along railway lines and crossed by the main highways, the St. Albert and Fort Trails.

The south side of the river is almost entirely residential, apart from the University and its associated uses and the old centre of Strathcona with its mixed land use pattern. Only in the southeast between the Calgary Trail and the river is there an industrial area. This, the newest of Edmonton's industrial districts, has resulted from the establishment of factories in an area zoned for industry. Here the oil and petrochemical industries occupy an as yet partly developed area. Sherwood Park, further to the southeast beyond this industrial area, is a new suburban town and dormitory suburb (Fig. 3).

In this chapter some of the factors which have more obviously affected the growth and character of manufacturing in the city have been discussed. It is necessary, from here, to trace the growth of manufacturing

before any analysis can be made of the present structure and pattern of manufacturing.

CHAPTER 2

THE CHANGING PATTERN OF MANUFACTURING

It is difficult to understand and interpret the present landscape without some reference to its past development. In this chapter an attempt is made to analyze historical events of importance in the evolving areal pattern of manufacturing found in Edmonton, as it grew rapidly from a Hudson's Bay Company fort to be the capital of Alberta and a most significant city in modern Canada.

THE FOUNDATION OF THE CITY

The foundation of Edmonton, as of so many Western Canadian cities, can be traced to the fur trading companies.

From the Fort to the First Settlers

The forts at Edmonton had rather an unsettled foundation. The original forts were not built on the site of the present city but at the mouth of the Sturgeon River across from the modern town of Fort Saskatchewan.[1] The North West Company established its fort, Fort Augustus, early in 1795 and by the fall of the same year W. Tomison of the Hudson's Bay Company had built Fort Edmonton a few hundred yards away. These forts only lasted seven years and in 1802 were abandoned. New forts were built on the river

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[1] The account of the early history of the forts is taken from J. G. McGregor, Blankets and Beads, Edmonton, 1956.

flats a little to the east of the north end of the present 105th Street Bridge. In 1810 because of flooding both companies moved to an area near Smoky Lake, fifty miles to the northeast. But after two years the forts were moved back to the river flats at Edmonton.[2] After 1812 the only move was to higher ground on the amalgamation of the two companies in 1820. This was the first confirmation of the view that the North Saskatchewan valley was difficult to develop, largely because of the periodic floods. The Fort remained in its position on higher ground until it was finally demolished in 1915.

After 1820 the young Fort Edmonton soon became a significant focus of activity in the fur trading empire. It was a crossroads in the fur trade and the point of departure for the north and northwest. Expeditions were outfitted here before moving on to other forts in the area: Rocky Mountain House, Fort Assiniboine and other forts on the Lesser Slave Lake. These functions led to the first industries: blacksmithing, carpentering, coopering, gunsmithing and tailoring. These services did not only supply the resident population but also most of the northwestern fur trading area. Later Fort Edmonton became the major centre for the construction of York boats on the North Saskatchewan. These boats were the chief means of transport on the prairies until the use of Red River carts in the 1850s, although the first of the latter did not reach Edmonton until 1862.[3]

The beginning of true settlement only, however, commenced after the

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[2] At the same time a complaint was received from London to "stop moving Fort Edmonton about, or if you must, give it a new name at its new location. It is all highly confusing."

[3] Edmonton Journal, 22 May, 1954.

cession of Rupert's Land by the Hudson's Bay Company to the Government of Canada in 1869. In 1870 the first settlers took up lots outside the 1,000 acre Hudson's Bay Company Reserve, in what was to become the centre of the modern city.

During the next twenty years progress was slow and the fort, itself, remained the most important part of the new settlement. The nearest established settlement was Portage La Prairie, sixty miles west of Winnipeg, but Edmonton was not supplied from this settlement but from St. Paul in Minnesota. The first major link with other settled areas was the extension of the telegraph to the village from Hay Lakes in 1879. The arrival of the telegraph allowed the establishment of the first printing works, and the publication of the first newspaper, Frank Oliver's Edmonton Bulletin, with a press brought overland by Red River cart from Winnipeg.

At the same time other small industries were being established to service the slowly growing village and the increasing number of settlers in the nearby area. Amongst these was William Bird's water-powered grain mill. This was imported from England and brought by steamboat up the North Saskatchewan. Unfortunately the mill's operation was short-lived as water was frozen during the most important part of the year for the milling of grain.[4]

The First Railway

At this time, the mid 1870s, there was much discussion and rumour over the route of the first transcontinental railway. The original survey anticipated using the Yellowhead Pass and a northerly route through the

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[4] T. Cashman, More Edmonton Stories, Edmonton, 1959, p. 37.

Prairies. This produced a small boom in settlement at Edmonton which soon broke when it became clear that the southern route through the Bow River route and Kicking Horse Pass would be used.

Despite the disappointment caused by the failure to use the northern route, by 1887, Edmonton had grown to 150 permanent residents and had become the outfitting centre for the northern portion of the Alberta district of the North West Territories.

Its position was enhanced by the construction of the Edmonton and Calgary branch of the Canadian Pacific Railway in 1890-1891. The construction of the railway also produced the only serious rival to Edmonton's position as the regional centre of the northern half of the province. This was the town of Strathcona which grew up at the railhead on the south side of the river. This railway did not cross the North Saskatchewan until the completion of the High Level Bridge in 1912. After the railway was completed in 1891 it was widely canvassed that as the bulk of settlers would obviously arrive at the railhead in future, that the Lands Office should be moved to Strathcona.[5] In some way this was prevented and Edmonton incorporated as a town in 1892.

The building of the railway should have given Strathcona advantages for the development of industry but for several reasons they were never very significant. Any advantages that might have been gained were lost on the first occasion that there was any real attractions for the development of industry in this area. Edmonton and Strathcona because of their position at the railhead to the northern North West Territories, became the outfitting centre for parties setting out overland for the Klondike,

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[5] McGregor, op.cit., p. 181.

during the gold rush. Although Strathcona had the advantage of proximity to the railway, most of the outfitting was done on the north side of the river. The river had to be crossed before proceeding to the Yukon and it was simpler to obtain the supplies on the northern bank. This helped Edmonton along the path to becoming the dominant of the two towns. But the real development of industry waited on the expansion of population and settlement which was to come in the first decade of the twentieth century.

Manufacturing in both towns was beginning to show some of the characteristics which are still dominant today. This was despite the fact that the market was restricted to the local population and the incoming settlers. Some indication of the type of manufacturing industry found here is available for Strathcona in 1903.[6] The most significant enterprises included three meatpacking plants, a tannery, a butter factory exporting to the Yukon and Great Britain, and brickworks.

The distribution of industry was then very similar to the pattern today. The greatest concentration of industry was found near to the Edmonton and Calgary railway yards. This was at the point where the railway crossed Whyte Avenue as already a spur line extended to Saskatchewan Drive. The main exception to this was the meatpacking plants which were along the line of the Edmonton, Yukon and Pacific Railway which ran along Mill Creek Ravine; a site perpetuated by the present plant of Gainer's Limited. The only notable difference from the modern pattern of industrial distribution was the location of certain factories along the Saskatchewan River valley.

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[6] Strathcona, Board of Trade, Strathcona, Railway Town and Manufacturing Town of Northern Alberta, Strathcona, 1903.

Amongst these were John Walter's sawmill, two brickworks and the Strathcona Brewing Company. The situation of the latter was due to the use of spring water in the manufacture of the beer, the brickworks used deposits of brickclay found in the river valley and the sawmill presumably used the river to carry logs. Other manufacturing enterprises included foundries, machine shops, wagon and sleigh works and a printing factory.[7]

From less direct evidence, mainly advertisements in contemporaneous publications, Edmonton's manufacturing structure would appear to have been very similar to that of Strathcona. The majority of the industrial establishments were in the modern downtown area, the only exception being the brickworks and boatyards along the river bank. Here again industry was mainly oriented to supplying the needs of the increasing number of agricultural settlers.

The Agricultural Boom

The construction of the second transcontinental railway, the Canadian Northern Railway,[8] finally gave all the advantages to the north bank town. This railway reached Edmonton in 1905 and used the Yellowhead Pass through the Rockies. It was not, however, the first railway to reach Edmonton for it had been preceeded by the Edmonton Yukon and Pacific Railway, in 1902. This line ran from south of the Canadian Pacific station in Strathcona, down the Mill Creek Ravine, and across the North Saskatchewan over the Low Level Bridge. Once on the north side of the river, it continued west along the river bank and up the Groat Creek Ravine to the vicinity of Stony Plain Road.[9] Eventually it was joined to the Canadian Northern main line. The Edmonton Yukon and Pacific, like

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[7] Ibid., p. 12

[8] This company and the third transcontinental line, the Grand Trunk Pacific, were amalgamated in 1917, to form the major part of Canadian National Railways.

[9] The grade can still be seen above the Royal Glenora Club.

so many railways, was grandiose in conception although its route never exceeded ten miles in length. At least it provided the reason for building the first bridge across the river at Edmonton and for many years it was used to carry coal to the power station.

The first train, on the latter line, ran on October 24, 1902 and for three years it was the sole railway connection to Edmonton.[10] In November, 1905 the Canadian Northern Railway reached the city and it was not long before the presence of the new tracks greatly altered the distribution of industry. It became practical for the first time to build plants away from the immediate built-up area, and other benefits were to be derived from this new method of communication. Factories were built mainly along the approach of the Canadian Northern Railway to the east, out from the already developed urban core (Fig. 4). The most significant concentration was to be at the village of North Edmonton which became the site of the city stockyards, built north of the railway, at what is now 127th Avenue (Fig. 11). The stockyards attracted large scale meatpacking plants which were then able to use the stockyard facilities. Burns and Company's factory was the first constructed, in 1908, and three years later this was followed by the Swift Canadian Company.

The Grand Trunk Pacific, the third transcontinental railway had reached Edmonton by 1911. Its lines were parallel to those of the Canadian Northern, although it entered Edmonton through Fort Saskatchewan, and its main yards were built north of the present Municipal Airport, while the Canadian Northern crossed the river at Clover Bar. The new railway had little effect on industry and it merely duplicated the Canadian Northern's

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[10] Edmonton Journal, 20 October, 1957.

service.

After 1901 there was both a greater overall growth and expansion of manufacturing activity in Edmonton compared to Strathcona(Table VI). This can be attributed to a variety of factors, including the location of the stockyards, and the position of Edmonton as provincial capital after 1906. Gainer's, alone, of the three south side packing plants has survived. The fact that Edmonton was on the north side of the river was also of considerable significance as the North Saskatchewan had to be crossed before proceeding further north. The outfitting of the new settlers became concentrated on the north bank. Strathcona had grown up only because it was the railhead and this was not sufficient to outweigh the better situation of Edmonton to serve the northern part of the province. Any advantages it did possess were lost when Edmonton, too, was served by a transcontinental railway.

The greater development of the north side continued after the amalgamation of the two cities and the building of the High Level bridge in 1912. It is only since 1950 that the south side of the city has expanded at a rate comparable to that of the north. This development is largely due to location of the petroleum refining and petrochemical industries to the southeast of the city.

By 1914 manufacturing was primarily of two kinds, first, that which served the local regional market, the city itself, and northern Alberta, and, secondly, that serving the national and even international markets. The growth of the former was very closely connected with the growing settlement of the northern part of the province and the parallel growth of the city (Table VII). In the nine years from 1903 to 1912 the city's population grew by 770 per cent and the assessed value of buildings

TABLE VI - MANUFACTURING IN EDMONTON AND STRATHCONA, 1901 and 1911

City	Population	Number of Establish.	Value of Capital	Number of Employees	Value of Salaries & Wages	Cost of Materials	Value of Products
			1901				
Edmonton	2,626	8	210,302	103	47,925	148,410	243,778
Strathcona	1,550	5	305,976	102	43,825	104,073	177,314
			1911				
Edmonton	24,900	40	3,816,120	1,560	1,007,724	2,588,046	4,493,304
Strathcona	5,579	11	1,003,327	191	140,013	316,453	740,061

Source: Fifth Census of Canada, 1911.

by more than 3,800 percent. The local manufacturing industries largely consisted of such manufacturing as metal fabricating and printing. The national group, referred to above, was mainly agricultural processing which was dependant on the increasing settlement for its raw materials but its markets were to a considerable extent elsewhere. It is very probable, however, that the markets for this group were less widespread than today due to the perishable nature of the products, both meat and dairy produce.

The structure and areal pattern of manufacturing which had been established by 1914 was maintained with slight modifications for the next twenty-five years. The boom immediately prior to the First World War left its mark on industry for many years. Most of the older industrial buildings and districts were built in this period and contrast markedly with the more recent industrial districts growth.

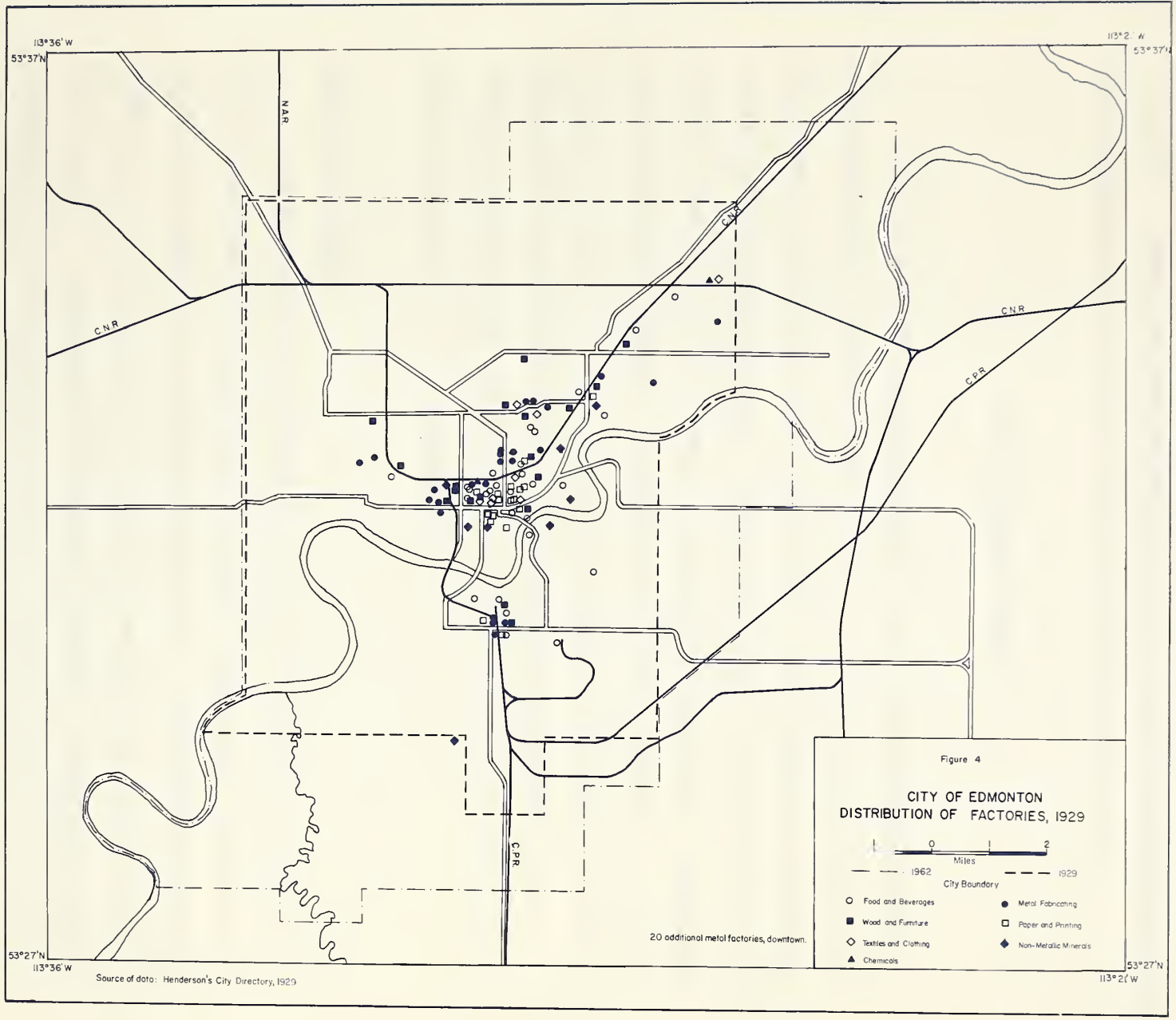
TABLE VII - GROWTH OF EDMONTON, 1894 - 1912

Year	Assessed Value $	Population
1894	988,950[1]	-
1899	1,188,249[1]	2,212[1]
1903	3,208,100[1]	6,995[2]
1906	17,046,788[1]	14,088[2]
1911	46,494,740[1]	31,064[2]
1912	123, 475,070[2]	53,611[2]

[1] Edmonton only.

[2] Edmonton and Strathcona.

Source: Henderson's City of Edmonton Directory, Winnipeg, 1913. City Assessor's Records.


113°36' W
53°37'N
113°2. W
53°37'N
N A R
C N R
C N R
C N R
C P R
C P R
20 additional metal factories, downtown.
Figure 4
CITY OF EDMONTON
DISTRICT OF FACTORIES, 1929
0
1
2
Miles
1962
1929
City Boundary
Food and Beverages
Wood and Furniture
Textiles and Clothing
Chemicals
Metal Fabricating
Paper and Printing
Non-Metallic Minerals
53°27'N
113°36' W
Source of data: Henderson's City Directory, 1929
53°27'N
113°2' W

The peak of this early development of the city came in 1914 and was only halted by the outbreak of war. In that year the population of the city reached over 72,000, a figure which it did not reach again until 1929. Once the boom was over the expansion of the city moved slowly, and intermittently, until the outbreak of the Second World War.

THE INTER-WAR PERIOD

During most of the period between the two wars Edmonton merely consolidated the growth which had occurred during the first decade of the century. There was very little change in the industrial structure of the city during this time. Industry was based on agricultural and forestry resources with secondary manufacturing developed to supply the local and regional market. The pattern of industry similarly remained largely unaltered. The one significant event of this period was the depression of the early thirties which affected the economy of the Prairie Provinces very severely and caused a considerable decline in manufacturing activity in Edmonton.

Industry in 1929

A more detailed assessment of industry can be given by studying the state of manufacturing in any one year. Ideally this should be before the effects of the depression were felt. Unfortunately, however, sufficiently detailed statistics are only available for the decennial census years. A compromise is therefore necessary. The areal pattern of industry will be shown as it existed in 1929 and the census of 1931 will be used as the major statistical source. To use 1929 is convenient

in other respects as it was the year in which the city adopted the present street numbering system.[11]

The metal fabricating industries were the largest employers and included the greatest number of firms. These industries grew in the previous decade owing to the increasing use of motor vehicles and general mechanization on farms. There was a wide distribution of the location of these firms throughout the city but the largest concentration was in the immediate downtown area. In addition there were smaller concentrations around the primary suburban commercial centres, along Whyte Avenue, in the south, and 118th Avenue, on the north side. A similar pattern was followed by most of the other industries, especially those which can be regarded as service manufacturing.[12] The major site consideration of industries in this category is convenience for the customer. This is also true of the printing industry, with an even greater concentration in the downtown area, bakeries and other small food and beverage factories, and the smaller wood and furniture plants.

The exceptions to this pattern were the meatpacking plants and the brickworks. The former were found in three areas, a few smaller firms to the east of the business district, while the larger plants were divided between the village of North Edmonton and Mill Creek Ravine on the southside. The two firms in North Edmonton enjoyed close proximity to the city stockyards. The brickmaking plants, reduced in number, were still confined to the river valley, as in 1913. They were unlikely to

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[11] The prime source used was Henderson's City of Edmonton Directory, Winnipeg, 1929.

[12] Service manufacturing is completely dependant on the local market and exists to supply its demands only.

move away from the deposits of brickclay.

The beginning of dispersion away from the central concentration, between Jasper Avenue and C.N.R. line and extending from 96th Street west to the C.P.R. line in the vicinity of 109th and 110th Streets, can be seen (Fig. 4). There was a scattering of plants along the main C.N.R. line, to the north east, including some wood products factories and the large building of the Northwest Biscuit Company.[13] In the rest of the city, the west and south, there was very little industry but the New Edmonton Brewery had been established at 104th Avenue and 121st Street, where the C.N.R. line turns north towards Calder Yards, and in 1929 the Dominion Bridge Company constructed a plant on a neighbouring site. This was the first significant industrial development in the western part of the city. The pattern of manufacturing had changed little on the south side since the amalgamation of the two cities. John Walter's sawmill which stood at the south end of the 105th Street Bridge had disappeared.

One interesting aspect of manufacturing appears to be the existence at this time of multi-storied buildings occupied by a variety of enterprises. An example of this was the building at 10229 - 105th Street which housed on different floors a biscuit company, a jam manufacturer and an abattoir. The stockyards had attracted other industries besides meatpacking and both a soap works and a tannery were found within the yards.

The predominance of service manufacturing in Edmonton in 1929 is reflected in the distribution of employment which was concentrated in the food and beverages, metals and textiles industries in comparison with the

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[13] Edmonton Journal, July 28, 1936.

national distribution of employment between the various manufacturing groups.

TABLE VIII - COMPARISON OF EDMONTON'S SHARE OF THE CANADIAN POPULATION AND SELECTED LABOUR FORCE GROUPS, 1931

Group	Canada	Edmonton	Percentage of National Total
Total Population	10,376,786	79,197	0.76
Total Labour Force	3,927,230	31,788	0.81
Manufacturing Labour Force	442,681	3,232	0.73
Service Labour Force[1]	1,527,732	17,341	1.14

[1] Service Labour Force includes; transport, warehousing, trade, finance, community and personal service and clerical.

Source: Seventh Census of Canada, 1931.

A comparison of the proportions of the national population and labour force found in the city reveals the relative unimportance of manufacturing (Table VIII). It was in the service occupations alone that Edmonton had more than its proportional population share. When the expected number of manufacturing employees is calculated, the actual total was shown to have had a deficit of 359 or over ten percent of the number employed in manufacturing.[14]

Edmonton had only an excess of employees in three manufacturing industries; foods and beverages, metals and printing, publishing and bookbinding. The last two emphasized again the concentration on service manufacturing for the local market, and also, the function of Edmonton

[14] The expected number of persons employed in manufacturing, if Edmonton had had, in 1931, the same percentage of the Canadian manufacturing labour force as of the total Canadian labour force.

as an administrative centre. A closer examination of the metals industry further strengthens this assumption as most of the firms engaged in the industry either processed sheet metal or performed machining processes.

The relative concentration of the food and beverage industry can only be explained by the existence of an export trade. The domination of food and beverages would probably be even more outstanding if activity in the meatpacking industry had not been set back by the onset of the depression. In both 1921 and 1941 the food and beverage industry employed over one quarter of the total labour force in manufacturing (Table IX). The large number of workers employed in the clothing industry also demands comment. This industry is normally characterized by a high degree of localization in the largest centres of population. The isolated large cities of Canada seem to possess relatively flourishing garment trades, due generally to the success of one particular firm. This was the case in Edmonton in 1931 and remains so today.

Manufacturing declined during the depression and this affected not only meatpacking but also other activities.[15] [16] The number of persons employed in manufacturing decreased from 3,232 in 1931 to 3,005 in 1936.

The industrial structure changed very little prior to the Second World War. The only major firm to establish itself in the city during this time was Canada Packers. This enlargement of the meatpacking industry resulted in over 32 percent of the manufacturing labour force

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[15] In 1936, 19.3% of the manufacturing labour force was classified as "Out of Work", Census of the Prairie Provinces, 1936.

[16] The Northwest Biscuit Company's factory and the Broder Canning Company were closed in 1931, Edmonton Journal, January 10, 1931 and July 28, 1936.

being employed in the food and beverages industrial group, in 1941.

The war had little influence on the employment structure or the areal pattern of industry. The only major change was the establishment of an aircraft repair plant at the beginning of the war, by the Dominion Government. This created a new industrial complex between the airport proper and Calder Yards (Fig. 3). It also broadened the variety of manufacturing. Since that time the industry, now privately owned, has become one of the most significant basic industries in the city.[17] Growth of the factory was very rapid; in 1936 only twenty-two persons were classified as employed in automobile, cycle and aircraft repair with a further fifty-six engaged in air transport. By 1941 the number of persons in aircraft repair, alone, had risen to 506. At the end of the war the number had decreased but it has remained at approximately 3 percent of the manufacturing working force since 1945.

The war did, however, bring about a basic change in the rate of growth of manufacturing which until the 1940s had followed closely the pattern of the increase in population (Fig. 5). The sole exception to this was the decline in the labour force during the depression in the previous decade. After 1936 the manufacturing labour force grew at a rate considerably in excess of the increase in population; although during the war years the rate declined. From 1936 to 1941 the number engaged in manufacturing grew by 95 percent or 3,049 while the population only grew by 9 percent. The increase was largely due to the expansion of the existing industry rather than the introduction of new war industries,

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[17] Edmonton District Planning Commission, Economic Base Survey for the Edmonton Metropolitan Area, Edmonton, 1958, p. 17.

TABLE IX - EMPLOYMENT IN SELECTED INDUSTRIAL GROUPS, EDMONTON, 1921-1951.
Percentage of total Employment in Manufacturing

Year	Food and Beverages	Leather and Fur	Metals	Non -ferrous Metals	Textiles and Products	Wood and Paper	Printing and Allied	Chemical Products	Products of Petroleum	Non -metallic Minerals	Others
1921	26.7	1.6	17.5	4.2	18.1	8.6	11.2	0.8	-	3.3	8.1
1931	15.7	4.5	44.5	*	15.7	6.1	9.3	0.6	-	2.1	1.6
1941	32.5	2.7	31.7	1.8	10.1	8.9	7.7	0.9	-	1.6	2.7
1946	37.4	1.4	31.4	0.5	7.8	7.5	8.5	1.0	0.8	1.1	2.7
1951	30.0	1.0	32.7	0.6	8.0	8.5	6.6	2.4	7.1	1.5	1.6

* Included in metals total.

Sources: Census of Canada, 1921-1951.
Census of the Prairie Provinces, 1946.

other than aircraft repair. Growth was largely confined to the food industries, (Table IX) which accounted for one third of the total employment in 1941 and continued to increase both relatively and absolutely until it reached 37 percent of total employment in 1946. The rise in the food industries share of employment was due to the expansion of meatpacking (Table X).

TABLE X - GROWTH OF THE MEATPACKING INDUSTRY, 1921-1951

Year	Numbers Employed	Percentage change over preceeding decade
1921	449	-
1931	278	-38
1941	1,469	+527
1946	1,940	+32
1951	1,869	-4

Source: Census of Canada, 1921, 1931, 1941, 1946, 1951.

The tremendous spurt in meatpacking was due to the increase in demand, especially from Great Britain, when more distant sources were not available and an increase in the production and slaughtering of hogs which can also be traced to the demand of the British market.[18] The export of beef from Canada rose from an average of 10,899,000 pounds a year before 1939 to 162,707,000 pounds in 1944. The export of pork and bacon rose from 179,630,000 pounds to 717,714,000 pounds.[19] By 1942 Edmonton exported a

[18] Pers. Comm., General Manager, Canada Packers

[19] Canada, Dominion Bureau of Statistics, Canada Year Book, 1945, p. 592.

quarter of the total Canadian export of meat products.[20] Other aspects of industry gained from the war situation, in 1944 the Ogilvie Flour Mill reopened after being closed for two and a half years to fulfill a special contract with Great Britain.[21]

The war revived much of Edmonton's life when the city became an important centre of defence and general military activity. The main effect on manufacture was to strengthen the meatpacking industry as the mainstay of the manufacturing eonomy, and to consolidate the North Edmonton area as the major concentration of large-scale industry in the city.

Reconstruction in Europe, at the war's end, had its effect on manufacturing in Edmonton, especially in the demand for food and other necessities. Two examples of the influence of European relief on manufacturing in Edmonton can be given. One was the establishment of the only horse meat slaughtering and packing plant in Canada (Alsask Processors) which was begun as part of a Prairie Farm Rehabilitation scheme to rid the Prairie provinces of excess horses, in conjunction with U.N.R.R.A. From the beginning the major market for both pickled and canned horse meats was Europe, especially Poland. A larger plant in Swift Current has since been closed.[22] The other example is also connected with the packing industry although less directly. A soap factory obtained an order for 1,800,000 pounds of soap, again from U.N.R.R.A.

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[20] W. C. Wonders, "Repercussions of War and Oil on Edmonton, Alberta", Mélange géographiques canadiens offerts à Raoul Blanchard, 1959, p. 344.

[21] Edmonton Journal, July 24, 1944.

[22] Ibid., September 17, 1946. Pers. Comm., General Manager, Alsask Processors.

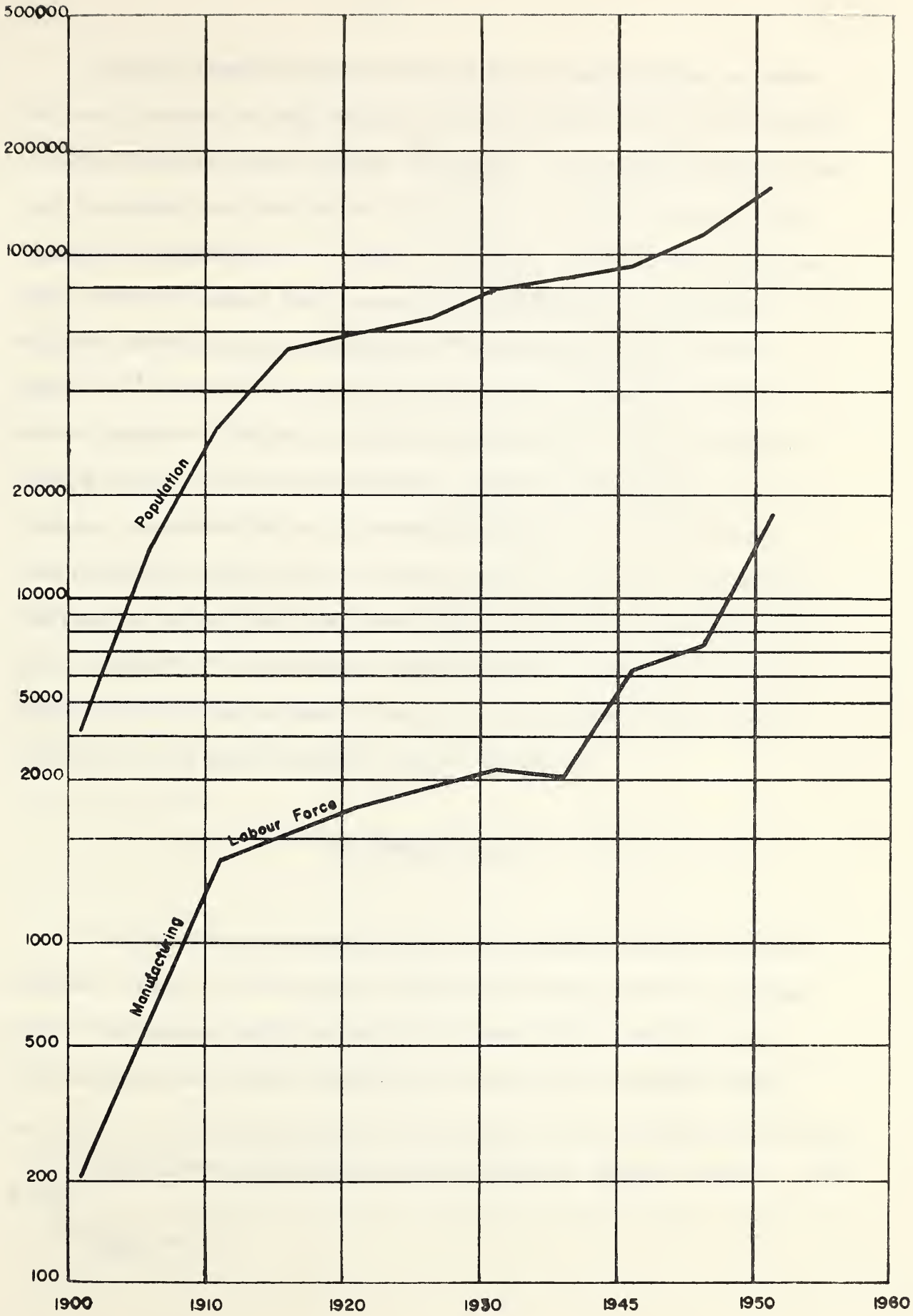

Figure:5 Edmonton, Growth of Population and Labour Force, 1901-1951

Source: Census of Canada

Overall there was very little growth of manufacturing, or even very much prospect of any, between the end of the war and the discovery of large deposits of oil and gas in Alberta. At the same time there was much discussion and speculation of the type of industry Alberta, and Edmonton in particular, could hope to attract. The few war industries which had been located here aroused the possibility of attracting industry under peacetime conditions. The Post-War Reconstruction Committee[23] set up by the Provincial Government recommended that a certain number of industries might be established in the province: including tobacco, shoes, woollen mills, chemical and furniture. Its findings could have led to an attempted attraction of industries by the provincial authorities, to satisfy the view that, "the industrial requirements of our people may best be met through the establishment of local industry".[24] Any effects that this report might have had were swamped by the economic boom of unrivalled proportions caused by the discovery of the Leduc-Woodbend oilfield in 1947.

THE EFFECTS OF OIL

The whole manufacturing pattern was radically altered after the discovery of oil. The two most significant results were the establishment of industries using the newly discovered oil as raw materials and the expansion of other industries to supply the increased market

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[23] Alberta, Post-War Reconstruction Committee, Report, Edmonton, 1945, p.304.

[24] Ibid., p. 12.

provided by the rapidly expanding population. During this period, "Alberta provides a good case study of what happens to an economy when a potential resource undergoes significant development".[25]

Early Oil Development

The discoveries of the Leduc-Woodbend field, and later the Redwater and Pembina fields were far from being the first oil developments in the province. Before 1947 production of oil was confined to the southwest of the province in the Turner Valley area which had been the major Canadian source of oil since 1925. Similarly natural gas had been used in the province for many years, and indeed the Viking gas field fifty miles to the southeast of the city had been the city's main source of gas since 1924 but its use was almost solely confined to heating purposes. Only in 1949 did the City Power Plant begin to use gas in place of coal and not until 1955 was it entirely converted to use gas.[26]

Post-Leduc Growth

The effects of the discovery and exploitation of the new oil resources were not immediate on the manufacturing structure of the city. Not until August, 1948, was the first refinery put on stream in Edmonton. This was operated by Imperial Oil and it was bought by them from the United States government. The refinery was shipped to Edmonton from Whitehorse in the Yukon. It originally had a capacity of 6,000 barrels

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[25] E. J. Hanson, The Dynamic Decade, Toronto, 1958, p. 7.

[26] C.N.R., An Industrial Survey of Edmonton Area, Alberta, Montreal, 1960, p. 45.

a day and the crude was brought in from the wells by truck. Later in the same year an eighteen mile pipeline was constructed from the Leduc field to the refinery.[27] This refinery was greatly enlarged in the next year and by 1955 it had a capacity of 25,000 barrels a day. In 1951 two other refineries were opened the first by the British-American Oil Company, with a daily capacity of 5,200 barrels and the last by the McColl-Frontenac Company, with a capacity of 5,500 barrels a day.

The location of the oil industry in Edmonton widened the resource base of manufacturing and created a new industrial complex within the metropolitan area which was entirely different in form and pattern from any previously existing in the city. It was not actually sited within the city but to the southeast, adjacent to the city boundary, in the county of Strathcona. Development was at a low density and the major requirements of the plants were large amounts of land and freedom from contact with other urban uses which might be adversely affected by their processes. The oil and petrochemical industries are not labour intensive industries but their growth is reflected in the breakdown of employment in the city (Table IX). The decrease in the proportion employed in the food and beverage industries can be seen to correspond closely to the new employment in the petroleum industries which had arisen by 1951.

The new supply of raw materials both from crude oil and natural gas, which had become more abundant at the same time, attracted plants of the youthful and fast expanding petrochemical industry. The bulk of the plants which located in Edmonton used natural gas as their prime

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[27] The source of much of this section is E. J. Hanson, op.cit., which gives a comprehensive history of the post-war growth of the oil industry in Alberta.

raw material but supplemented these with the by-products of the oil refining processes. Amongst the new plants was that of the Canadian Chemical Company. Construction began in 1951 and the plant went into production in August, 1953.[28] The main product of the plant is cellulose acetate and the original capacity was 12,500 short tons a year. During the same year, 1953, in November, the Canadian Industries Limited brought its polyethylene resin plant into production. This too was amongst the refineries although further south than the Canadian Chemical Company's plant at Clover Bar. Its major raw material is ethane for which the Leduc-Woodbend oilfield is one of the richest sources on the continent.[29] These two developments are still the most important chemical factories in Edmonton although they have since been joined by a host of smaller plants.

The oil development and the very favourable economic climate it engendered caused a tremendous upsurge in growth in Edmonton. The increase in oil and natural gas production (Table XI) was the basis for this, the latest boom in the history of the city. The rapid population increase and consequent enlargement of the market, both consumer and producer, which it caused attracted many other industries, apart from oil and its connected developments, to the area. This created new industrial districts both within and outside the city, including the industrial satellite of Fort Saskatchewan, twenty miles to the northeast.

The genesis of Edmonton's manufacturing industry was marked by a series of booms followed by years of stagnation. This has led to a rather

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[28] Shell Oil Company of Canada, The Canadian Petrochemical Industry, Toronto, 1956, p. 96.

[29] Ibid., p. 109.

TABLE XI - ANNUAL CRUDE OIL AND NATURAL GAS PRODUCTION, ALBERTA, SELECTED YEARS.

Year	Crude Oil		Natural Gas
	Production in bbls.	No: Producing Wells	Cu. ft. x 10^9
1917	8,500	-	.0068
1928	482,047	-	.0143
1946	6,700,000	523	50.6
1948	10,500,000	714	53.4
1949	19,800,000	1,242	67.1
1951	45,900,000	2,731	81.3
1952	58,900,000	3,661	92.9
1954	87,600,000	5,068	131.2
1955	113,000,000	6,138	161.7
1956	143,900,000	7,390	191.2
1957	137,400,000	8,016	227.2
1958	113,277,000	8,536	276.1
1959	129,962,000	9,217	352.7

Sources: Financial Post, Survey of Oils, 1929.
Alberta, Oil and Gas Conservation Board, Annual Report, 1960.

"scattered" evolution both in time and in areal pattern. It has only been recently that manufacturing has reached a sufficiently advanced level to allow the creation of specific industrial districts, apart from the meatpacking area. Despite this the present pattern of manufacturing industry has been significantly affected by the city's sixty years of continuous growth.

CHAPTER 3

CHARACTERISTICS OF INDUSTRIAL EDMONTON

Industrial Edmonton possesses some very definite characteristics despite the fact that the city is not primarily concerned with manufacturing. Its industrial structure is not unique, and it can be likened, to a certain degree, to those of the other major prairie cities, especially Calgary. It does, however, show features which mark it off from the other Prairie centres, as a manufacturing location. It has its own industrial complex,[1] or rather, group of complexes which make up the manufacturing industry of Edmonton. It can be claimed that the city's manufacturing industry makes up one complex, as all the industries are locationally interdependent even if unconnected in any other way. It is probably more meaningful to distinguish three distinct industrial complexes and to continue the discussion from that point later.

STRUCTURE OF INDUSTRY

The structure of manufacturing industry can be identified and examined in a number of ways. It is proposed here, first, to isolate the manufacturing complexes found in the city and then in more detail to describe and discuss the actual distribution of employment and production

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[1] "An industrial complex may be defined as a set of activities occurring at a given location and belonging to a group (subsystem) of activities which are subject to important production, marketing or other interrelations." W. Isard, Methods of Regional Analysis, New York, 1960, p. 377. To a geographer these interrelationships must be expressed in spatial terms or, at least, have an impact on the areal pattern of manufacturing in the region under study.

through the various manufacturing industries. In addition some of the other characteristics of industry within the city connected with the use of power and fuel sources, the distribution of markets and the sources of raw materials will be discussed. The intention is to give an overall picture of the nature of the present industrial scene.

The Manufacturing Complexes

The first subdivision of Edmonton manufacturing industry comprises those industries which are dependent on the local markets.[2] These can be classified as service manufacturing industries. In Edmonton this includes the bulk of industry and is represented in all the manufacturing groups,[3] from foods and beverages to the products of petroleum and coke. All these industries are characterized by the large proportion of their products sold in Northern Alberta, approximately the hinterland of Edmonton,[4] commonly in excess of ninety per cent of the total production. These do not make up a complex in quite the same sense as the other two complexes discussed. There is not the same degree of interrelationship between them apart from the fact that they are all dependent on the local market.

The second complex includes those industries which process livestock from this same hinterland. It consists mainly of the meat-packing and slaughtering plants as well as closely associated activities. Because it is closely related to raw materials it is similar to the third and final

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[2] G. T. Renner, "Geography of Industrial Localization", Econ. Geogr., Vol. 23, No. 3, July, 1947, p. 176.

[3] As defined in the Standard Industrial Classification Manual, Ottawa, 1960, pp. 10-11.

[4] An area within which economic and cultural activities are focussed in one primary centre, in this case Edmonton. For a discussion of this concept see, L. Dudley Stamp, Applied Geography, Harmondsworth, 1960, p. 167.

complex.

The final complex, the newest, processes local oil and natural gas to produce a variety of chemicals and chemical products. This complex, unlike others which are spread throughout the urban area, is confined, almost entirely, to the county of Strathcona (Fig. 8). The only important exception is the smaller chemical industry found in the town of Fort Saskatchewan, outside the metropolitan area proper.

These last two complexes include the basic manufacturing industries found in Edmonton.[5] The economic base also includes many non-manufacturing activities. It is easier to measure manufacturing industry and these have received prominence in the studies which have been made of the Edmonton economic base.[6] It can also be claimed that manufacturing is the only activity in Edmonton that is significant away from the local region.

The most outstanding characteristic of manufacturing as a whole in Edmonton is the existence of a greater diversity of industry than is found in the other Prairie cities apart from Winnipeg. There are some signs of a trend away from processing, although these industries are still dominant, and there has been the growth of a relatively large primary metals industry compared to other western Canadian cities. These developments can be traced to the impact of growth stemming from the expansion of the oil and gas industry.

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[5] The basic manufacturing industries are those industries which can be said to be the foundation of the city's importance, for a discussion of this concept see, J. W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions", Econ. Geogr., Vol. 30, No: 3, July, 1954, p. 246.

[6] Edmonton District Planning Commission, An Economic Base Survey for the Edmonton Metropolitan Area, Edmonton, 1958.

Analysis of Manufacturing

Industry can be examined in various ways, the most obvious is by reference to employment but probably a more complete picture can be gained from a study of the distribution of the value added by manufacture, through the various industry groups.[7]

TABLE XII - DISTRIBUTION OF EMPLOYMENT IN MANUFACTURING, EDMONTON METROPOLITAN AREA, 1960

Industry Group	Per cent of Total	Number Employed
Food and Beverages	30.6	5,237
Clothing	6.2	1,063
Wood	6.0	1,030
Furniture and Fixtures	3.6	618
Paper	1.9	327
Printing and Publishing	6.1	1,040
Primary Metal	6.5	1,120
Metal Fabricating	10.5	1,795
Non-metallic Minerals	5.7	980
Chemical and Chemical Products	5.8	988
Miscellaneous Manufacturing	2.0	344
Other Major Groups[1]	15.2	2,585
All Manufacturing Groups	100.0	17,127

[1] Includes: tobacco, rubber, knitting mills, transportation equipment, non-ferrous metals, electrical apparatus and products of petroleum and coke.

Source of data: Dominion Bureau of Statistics, Manufacturing Industries of Canada, Section G, Geographical Distribution, 1960, Ottawa, 1962.

[7] The difference between the costs of production (fuel, electricity and materials) and the selling value of the products.

Employment in Edmonton's manufacturing industries is markedly concentrated in the food and beverage industries. These account for over thirty per cent of the total employment in manufacturing (Table XII). They are by far the largest industry group and of the other industries, only the wood working and metal manufacturing employ more than ten per cent of the total work force. One half of those employed in food and beverages work in meatpacking and slaughtering. This is the largest single manufacturing industry of all groups, even including oil and chemicals. The value added figures give meatpacking a slightly smaller lead (Table XIII).

The chemical industries which have relatively few employees per unit assume importance when value added is measured. They have only 5.7 per cent of the total employment in manufacturing but contribute 12.5 per cent of the value added by manufacture in Edmonton. The significance of this large percentage of the total value added is increased when the dependence of this industry on oil and natural gas raw materials is considered. If the value added in manufacturing by oil refining is added to that of the chemical industry the proportion of the total value added by manufacturing the oil and gas resources would be in the region of twenty per cent. It can also be noted that the importance of the chemical industry is rising; from 1959 to 1960 alone, its share of the total value added rose from 12.5 per cent to 13.5 per cent.

The remaining industrial groups with a significant concentration of activities in Edmonton are the wood and non-metallic mineral industries. This can largely be explained by the importance of the construction industry in a city which is growing at the rate presently enjoyed by Edmonton. The importance of the demands of construction on these two industries is further emphasized when it is noted that a third of the value added by manufacturing

in each group is from concrete products and sash, door and planing mills, respectively. In Calgary the same sort of thing is happening in contrast to the case in Hamilton where the structure of industry is far more dominated by one group of industries, iron and steel (Fig. 6). This last city is taken as an example of a manufacturing city to compare the employment structure of those of two primarily service cities.

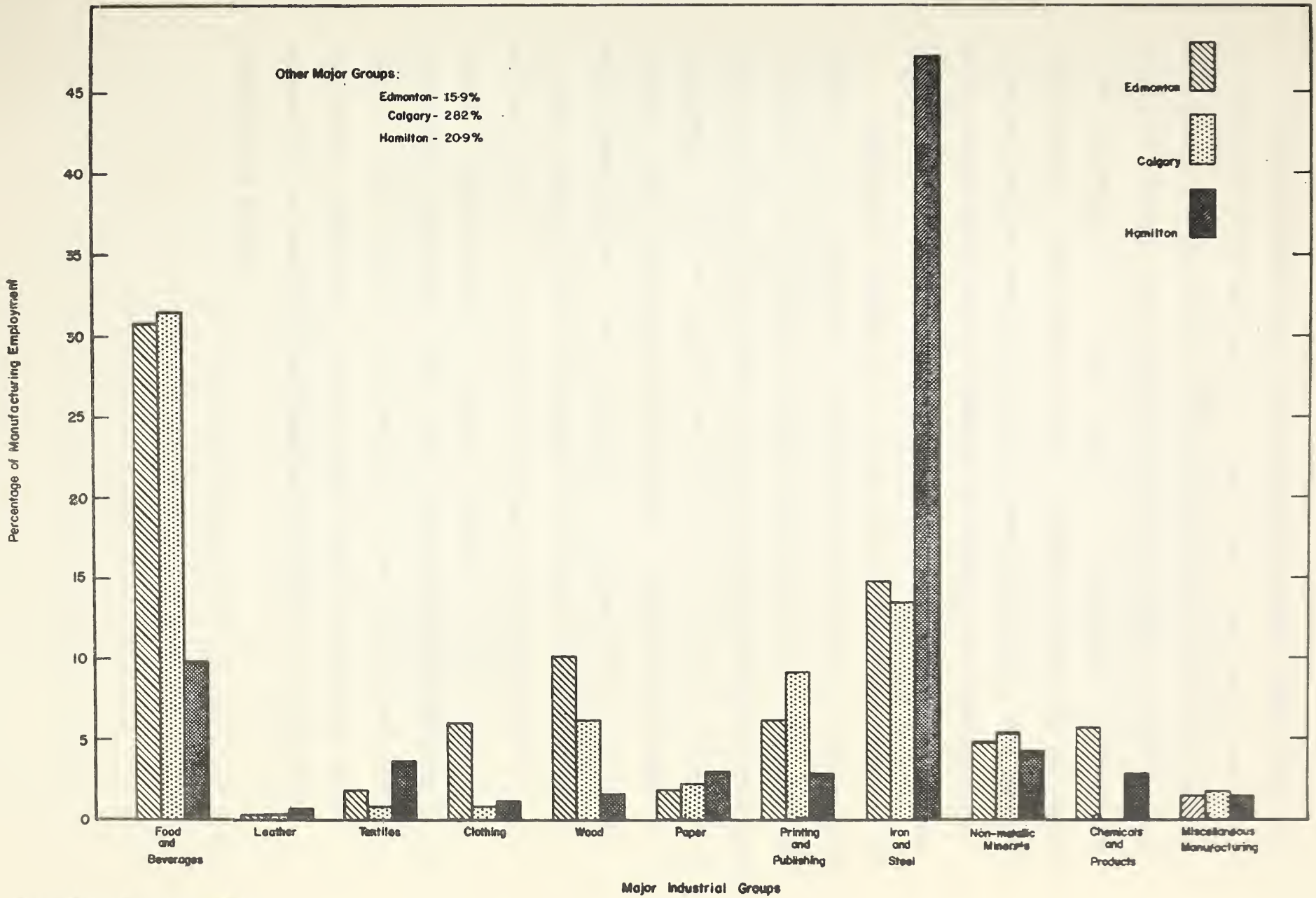
TABLE XIII - COMPARISON OF THE VALUE ADDED IN MANUFACTURING EDMONTON[1] AND CANADA, 1959

Industry Group	Per cent of total value added, Canada	Per cent of total value added, Edmonton	Edmonton as percentage of Canada
Foods and Beverages	15.6	29.1	2.9
Leather Products	1.2	0.2	0.2
Textile Products	3.5	1.6	0.7
Clothing	3.5	3.1	1.4
Wood Products	6.2	6.1	1.5
Paper Products	9.6	1.6	0.3
Printing and Publishing	5.3	5.4	1.6
Iron and Steel Products	15.2	12.5	1.3
Non-metallic Minerals	3.9	8.1	3.2
Chemicals and Allied	6.8	12.5	2.8
Miscellaneous Manufacturing	2.4	1.2	0.7
Other Major Groups	30.3	18.6	1.1
Value added in all manufacturing	100.0	100.0	1.5

[1] Metropolitan Area.

Source: D.B.S., The Manufacturing Industries of Canada, General Review, 1959 and Section G, Geographical Distribution, 1959, Ottawa, 1961.

Figure 6, MANUFACTURING EMPLOYMENT STRUCTURE, EDMONTON, CALGARY and HAMILTON, 1959.



Source of data: Dominion Bureau of Statistics.

The large employment in the clothing and primary metal trades can be attributed to the dominance of a single firm. Even taking this into consideration, Edmonton must have some advantages of location for these industries although good management has probably played an important role in the success of the two firms involved. The development of the primary metal industry, almost entirely steel, is strongly linked with the demands of the oil and gas industry for pipe and structural steels. The remainder of the manufacturing sector of Edmonton's economy is not remarkable and consists of the industries normally associated with metropolitan centres.

The relative importance of the various manufacturing industries in Edmonton can be discerned by a comparison of the structure of manufacturing in Edmonton with the national structure (Tables XIII XIV). The comparison clearly indicates the deficiencies and concentrations in Edmonton's manufacturing industry. The most significant deficiencies are in the iron and steel products, textiles and paper products groups. Again the value added table probably gives a truer picture than employment alone as it allows for those industries where productivity per worker is much above normal, such as chemicals. In the food and beverage, non-metallic minerals and chemicals groups, as might be expected, Edmonton has about twice the proportion of the national totals that it has for all manufacturing industry. This emphasizes the dominance of the processing manufacturing industries; a comparison of the two tables shows the variations in the productivity per worker between Edmonton and Canada in the different manufacturing groups.

TABLE XIV - COMPARISON OF EMPLOYMENT IN MANUFACTURING INDUSTRIES, EDMONTON[1] AND CANADA, 1959

Industry	Per cent of employment Canada	Per cent of employment Edmonton	Edmonton as a percentage of Canada
Food and Beverages	14.8	31.0	2.7
Leather Products	2.4	0.3	0.2
Textile Products	4.9	1.9	0.5
Clothing	6.7	6.0	1.2
Wood Products	9.5	10.1	1.3
Paper Products	7.2	1.9	0.3
Printing and Publishing	5.7	6.2	1.4
Iron and Steel Products	14.8	14.8	1.3
Non-metallic Minerals	3.3	4.8	1.9
Chemicals and Allied	4.2	5.7	1.8
Miscellaneous Manufacturing	2.9	1.5	0.7
Other Major Groups	23.3	15.8	0.9
Manufacturing Groups	100.0	100.0	1.4

[1] Metropolitan Area.

Source: Dominion Bureau of Statistics, The Manufacturing Industries of Canada, General Review, 1959, and Section G, Geographical Distribution, 1959, Ottawa, 1961.

MARKETS, MATERIALS AND UTILITIES

It is possible to further classify and examine the markets and raw material sources of manufacturing and to discuss briefly the fuel, power and water requirements of Edmonton's manufacturing industry.

Markets and Materials

It can be seen from a study of markets and raw material sources whether manufacturing is oriented either to the region or elsewhere. In many cases, however, there may be difficulty in deciding whether an individual factory, or even the industry it represents is primarily connected to the local market or to outside markets, because it supplies both. Similarly, manufacturing establishments may use materials both from the Northern Alberta region and from outside the region.

It is here postulated that first, there is a connection between the use of local raw materials from Northern Alberta, and a primarily export market and secondly, the use of imported raw materials, usually semi-finished products, for the supply of the local regional market. Industries in the first category include meatpacking, the most extreme examples of which are the horsemeat packing plant, and the petro-chemical plants. The oil refineries on the other hand produce almost entirely for the local market although some lubricating oils are distributed throughout Western Canada.[8]

The majority of firms tend to import raw materials for further finishing and processing before the finished product is sold to the local market. Within this grouping are printing and publishing, the iron and steel trades, clothing, some food processing trades, particularly beverages, and similar industries. These industries grow in size with the city and in recent years have expanded greatly, both in numbers and variety. An example of an industry recently established is the Continental Can Company. This firm manufactures cans from tinplate imported from

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[8] Pers. Comm., F. B. Doull, Plant Superintendant, Imperial Oil Refinery, 10 January, 1963.

Hamilton largely for the use of Edmonton factories.[9]

There are other firms and industries which cannot be classified in terms of local markets and imported raw materials or local raw materials and export markets. They use local raw materials and supply the local market or import raw materials and have a very significant market outside the local region. The former type is exemplified by the Inland Cement Company which gets its raw materials partly from the immediate Edmonton area and partly from Cadomin, near Edson, 150 miles to the west. The major portion of its market is within northern Alberta.[10] The sole significant example of the latter type is the Great West Garment Company. This firm imports cloth from Montreal and Welland, Ontario, but its market is national although four-fifths is in Western Canada, a type of manufacturing which is very unusual.[11]

Fuel and Power

Fuel and power costs are significant to a few of Edmonton's manufacturing industries. Only in the chemical and non-metallic mineral groups are they in excess of ten per cent of the total costs of manufacturing. This partially a reflection of the fact that total costs in Edmonton are higher than the national average, but also of the abundance of low cost natural gas, by far the major source of fuel and power.

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[9] Pers. Comm., C. Gilaudeau, General foreman, Continental Can Company of Canada, November, 1962.

[10] Pers. Comm., D. Connelly, Market Analyst, Inland Cement Company, 12 February, 1963.

[11] Pers. Comm., General Manager, Great West Garment Company, November, 1962.

TABLE XV - SALES AND COST OF NATURAL GAS, FOR INDUSTRIAL USE, BY PROVINCE, SEPTEMBER, 1962

Province	Gas Sold Million Cubic Feet	Cost per Million Cubic Feet, in cents
Quebec	1,581,616	0.40
Ontario	6,197,497	0.50
Manitoba	572,955	0.31
Saskatchewan	1,431,792	0.21
Alberta	7,534,729	0.15
British Columbia	1,360,738	0.42
Canada	18,679,327	0.32

Source: Dominion Bureau of Statistics, Sales of Manufactured and Natural Gas, September, 1962, Ottawa, 1962.

Alberta, is both the largest producer and consumer of natural gas in Canada (Table XV). The cost of natural gas is the lowest in Canada, less than half of the average price and less than one-third of the price in Ontario. This is not only reflected in low fuel costs but also in electricity costs. The city power plant is a gas burning thermal-electric installation so that the cheapness of the gas is directly mirrored in the prices of electricity.

Water Use

The problems of water supply in Edmonton have been discussed in an earlier chapter so that further reference here will be restricted to manufacturing use. The difficulties have been aggravated in recent years by the growth of industries using large quantities of water. This has not only affected the consumption of water but has worsened the pollution

problem. It is, perhaps, unfortunate that the two largest manufacturing industries in Edmonton, meatpacking and petro-chemicals (including refining) should both be characterized by considerable water consumption for cooling, washing and processing. Further, both groups produce effluent on a considerable scale.

Some appreciation of the extent of water consumption in manufacturing can be gained with reference to individual firms. The Swift Canadian meat-packing plant consumes over one million gallons a day for a variety of uses but mainly for steam raising and washing. The oil refineries and the chemical plants are similarly large consumers. The Imperial Oil refinery draws some three million gallons from their own intake for cooling. Only five per cent of this is returned to the river, the remainder is evaporated.[12] The terylene plant of Canadian Industries Limited is another major consumer, which uses three hundred thousand gallons a day, mainly for cooling purposes.[13] Similar large amounts are used by the other oil refineries, chemical and meatpacking plants. The whole demand is a considerable percentage of the total consumption of the city.

The pollution problems have been already discussed and further discussion is unnecessary. It is significant, however, that all these firms mentioned above possess primary sewage treatment facilities and many use recirculating cooling systems.[14]

Within the city itself some manufacturing areas have common features which give them a character apart from the general character of the city's industry. There are, also, important reasons for the present distribution

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[12] F. B.Doull, op.cit.

13 Pers. Comm., D. Bedard, Assistant Personnel Manager, Canadian Industries Limited, November, 1962.

[14] Primary sewage treatment by means of settling tanks before the water is returned to the river. The recirculating cooling system cools and returns hot water to the system. Further amounts of water are only added to make up losses from evaporation.

of manufacturing within the city. The distribution partly reflects trends common to all Canada but also others which show adjustment to the unique circumstances at Edmonton. Manufacturing in Edmonton is dominated by food and beverage industries and the industries related to the petroleum and natural gas resources. This is the most outstanding characteristic of the industrial structure of the city. The comparison of manufacturing in Edmonton with manufacturing in Canada as a whole, emphasizes the relatively undeveloped nature of Edmonton's industry and the dependence on primary processing. Other manufacturing with a significant localization in the city is very closely connected to the demands for general constructional materials, created by the current rapid growth of the city's population.

The general study and analysis of industry outlined in this chapter is really only the backcloth upon which the detailed areal industrial pattern and nature of the city can be studied. The important characteristics of industry have been noted in general, the next step is to show the areal variations which contribute to the general spatial pattern which typifies Edmonton as a manufacturing centre.

CHAPTER 4

THE PRESENT INDUSTRIAL ENVIRONMENT

All cities of the size of Edmonton have to some degree an areal arrangment of functions into commercial, residential and industrial sectors. In each case the actual arrangment is unique although some common pattern can be found in all cities. This thesis embraces the geographic study of one of these sectors, the manufacturing areas. From this study it is hoped to know more of the nature of industry in Edmonton and its requirements of land, services, plant layout and accessibility to the general movement of traffic and trade in the city. The siting of a factory in the city is a compromise among these factors. Other factors too, may effect the site decision and of these town planning has been most significant in Edmonton.

MANUFACTURING IN THE URBAN SCENE

The overall impression of the distribution of industrial land within Edmonton is of a relatively simple pattern related to the railways(Fig. 3).[1] The future pattern will be governed by the availability of vacant land, zoned for industrial use, most of which is on the edge of the built up area. The bulk of industry,[2] and more specifically manufacturing, appears to be on the outskirts of the urban area.

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[1] The distribution shown in figure 3 is that of all industrial land not merely that used by manufacturing firms.

[2] The term industry, as used here, embraces warehousing, construction and general servicing activities, as well as manufacturing.

This pattern has been made possible as Edmonton is a city sufficiently young to have avoided the worst consequences of industrial growth and conflicting land uses. Nevertheless, there are some areas of mixed land use in the older inner parts of the city, notably to the east of the city centre, between Jasper Avenue and the C.N.R.. Most of the manufacturing industry is, however, found in specific industrial districts from which successful attempts have been, and are being, made to exclude other land uses.

The General Distribution of Manufacturing

The generalized distribution of industrial land has been outlined above. The bulk of industrial development lies on the outskirts of the city, especially to the northwest, the northeast and in an arc along the southeast of the city from Clover Bar to the Calgary Trail and the main C.P.R. line south to Calgary. In addition there is industrial land further inside the city paralleling the swathes cut by the railways across the general built up area.

One such development is along the C.P.R. line from the city boundary north of Whyte Avenue. Factories extend for several blocks on either side of the railway although not west of the Calgary Trail. There are only a few plants north of Whyte Avenue, largely relict sites from the growth of Strathcona in the early part of the century.

On the north side of the Saskatchewan River there are manufacturing establishments on all the major railway lines both as they enter the city from the east and leave to the west. Those to the east, north of 111th Avenue and along the Fort Trail, are amongst the oldest manufacturing firms in the city. In the west most of the plants are of postwar origin and in the extreme northwest, on the city boundary with Jasper Place and the County

of Sturgeon, there is an industrial district still undergoing development. The railway line through Calder Yards has attracted less manufacturing and the largest factory in this area is orientated to the municipal airport rather than to the railway.

Besides these industrial areas there is a considerable amount of manufacturing, especially in certain industries, in the central area. Factories are scattered through the central business district and in the fringe areas, specifically to the east of 97th Street. The number of different land uses makes it difficult to distinguish industrial zones, for small manufacturing plants are to be found mixed in with residential and commercial developments.

Apart from the central area there are other manufacturing plants outside the industrial districts outlined in the preceeding paragraphs. These are often isolated sites connected with the older suburban commercial areas along 118th and Whyte Avenues. This is, however, not true of the largest isolated development that of Gainer's Meatpacking plant in the Mill Creek Ravine.

Edmonton has not developed any planned industrial estates or districts in the accepted meaning of the term but there are areas being developed which are of a similar character.[3] The largest of these districts are owned by the city, one in the south and the other in the northwest. The former lies to the east of the Calgary Trail and south of 63rd Avenue while the latter is west of 142nd Street around the main C.N.R. line to the west coast. They have been deliberately developed as industrial districts, although not

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[3] R. E. Boley, "Industrial Districts Restudied", Urban Land Institute, Technical Bull. No: 41, Washington, 1961, p. 11

confined to manufacturing firms, with services and subdivision specifically orientated towards industry's needs.[4] There have been smaller private ventures of a similar nature. The Hudson's Bay Company, in the autumn of 1949, began the development of a small area between 119th Street and the C.N.R. line for industry and this area has now been completely developed. The railway companies have laid out areas in other parts of the city.

A loose form of control is exercised over the whole of the Strathcona industrial area by the Edmonton District Planning Commission. The Commission is responsible for the overall distribution of industrial land in the metropolitan area. It can restrict industrial development to the areas of the city zoned for industry but cannot direct a factory to one specific site. In the preliminary plan for the Edmonton metropolitan area, this has been adopted as an industrial zone, the major location for heavy industry in the metropolitan area.[5] Facilities and services have been provided for industry including rail lines, gas and oil pipelines and roads, with the co-operation of the County of Strathcona. There has been considerable success in keeping conflicting uses out of this area. The only major problem has been the creation of the new suburban community of Sherwood Park to the southeast (Fig. 3).

The structure of Edmonton is such that it can only be classified as a service city and this has had an impact on the form of the several manufacturing districts. There are only two districts which are given over wholly to manufacturing uses - the meatpacking area in the northeast

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[4] Pers. Comm., Mr. J. Warner, Land Department, City of Edmonton, November, 1962.

[5] Pers. Comm., Mr. F. Marlyn, Director, Edmonton District Planning Commission, October, 1962.

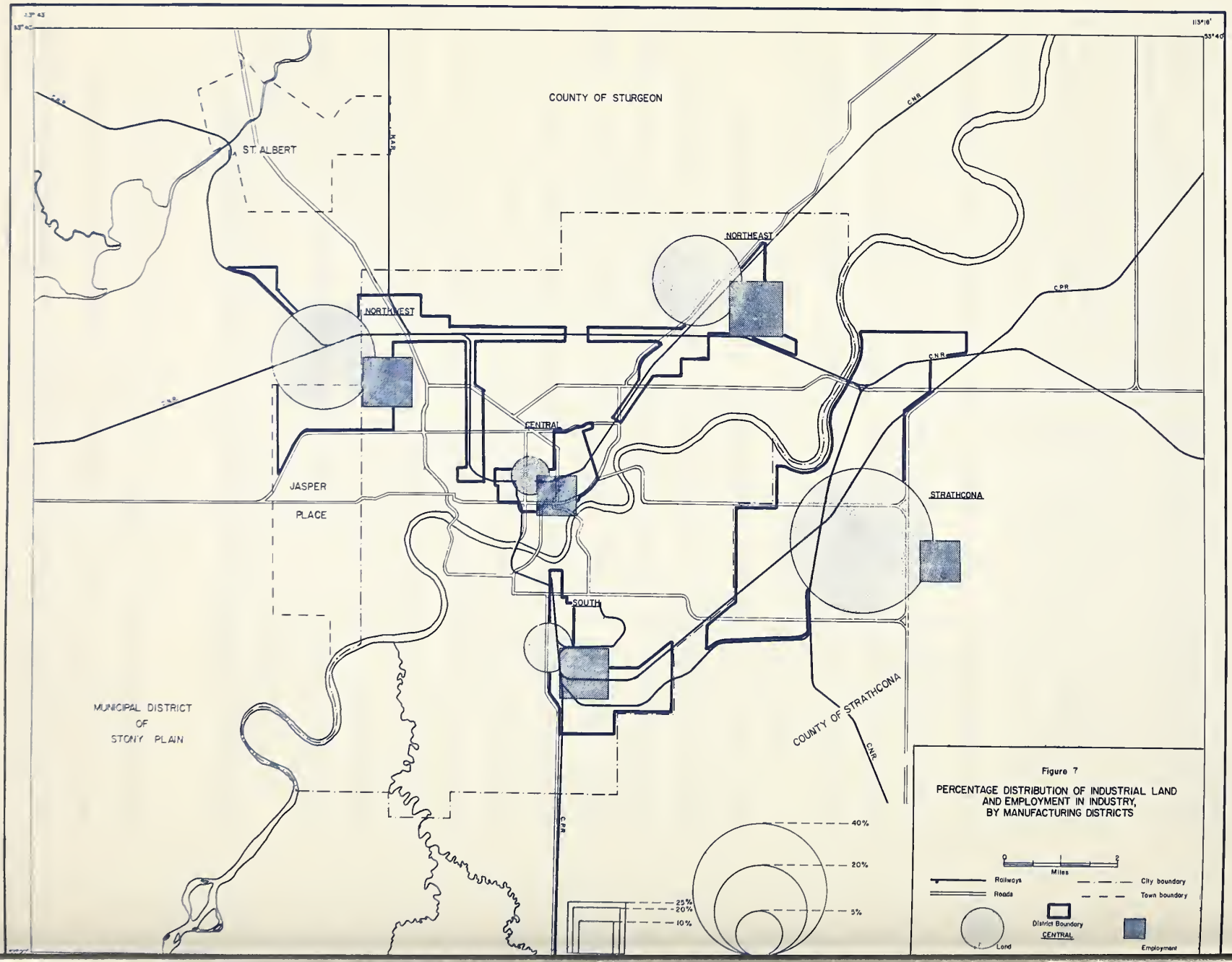

Figure 7

PERCENTAGE DISTRIBUTION OF INDUSTRIAL LAND AND EMPLOYMENT IN INDUSTRY, BY MANUFACTURING DISTRICTS

and the Strathcona area (Fig. 3). Elsewhere manufacturing activities tend to be scattered and mixed with other land uses. The overall pattern tends to be punctiform with relatively few aggregations.

The Pattern of Manufacturing Land Use and Industrial Employment

A comparison of the distribution of the land used for industrial purposes and employment shows the contrast in the distribution of the two (Fig. 7).[6] Approximately one half the land used for industry lies outside the city boundary, largely in Strathcona, compared to less than one fifth of the employment. This in itself summarizes the differences between the older manufacturing districts within the urban core and the new suburban fringe factories which have been built since 1950. The latter plants are characterized by a low employment density even compared to the densities in the new suburban factories within the city boundary. The recent developments within the city tend to be on a much smaller scale than those in Strathcona, and elsewhere outside the city limits.

The relative importance of the various districts changes radically according to whether employment or land use is compared. The former is the more significant but a comparison of the two emphasizes the differences in form and function expressed by employment density.[7] The contrast between a clothing factory, with a density of one employee to 155 square feet, and

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[6] The data obtained did not distinguish between manufacturing and other industries. It was not possible to separate manufacturing from the others but it was felt that this did not invalidate the use of the data.

[7] The employment density is the ration between the number of workers and the total workspace, both inside and outside the factory. It was not found practical to use floor space, as in many cases this was not known.

an oil refinery, with a density of one employee to 20,180 square feet, in appearance and requirements can quite readily be summarized in this way.

THE MANUFACTURING DISTRICTS

At an early stage in the progress of this study it was possible to divide the city into five manufacturing districts. There were no existing divisions for the different manufacturing areas of any kind so that the demarcation had no preconceived basis. Delimitation facilitated the study of the nature of manufacturing in Edmonton and emphasized the real areal differentiation in manufacturing in the city. The boundaries of these districts (Fig. 7) were easily defined, as the districts are generally widely separated. In all cases, however, the boundaries were checked in the field and the districts so defined were used as the areal basis for a survey of selected firms by questionnaire and interview. Five zones were delimited: the Central district, the Northwest, the Northeast, the South and Strathcona.[8]

Except for the Strathcona district, and possibly the Central district, these areas do not have highly specialized functions. Smaller areas with a common manufacturing activity can be identified within the larger districts. The best example of this is the meatpacking industry which is mainly concentrated in the vicinity of Fort Trail between 123rd and 129th Avenues (Fig. 11), part of the Northeastern district.

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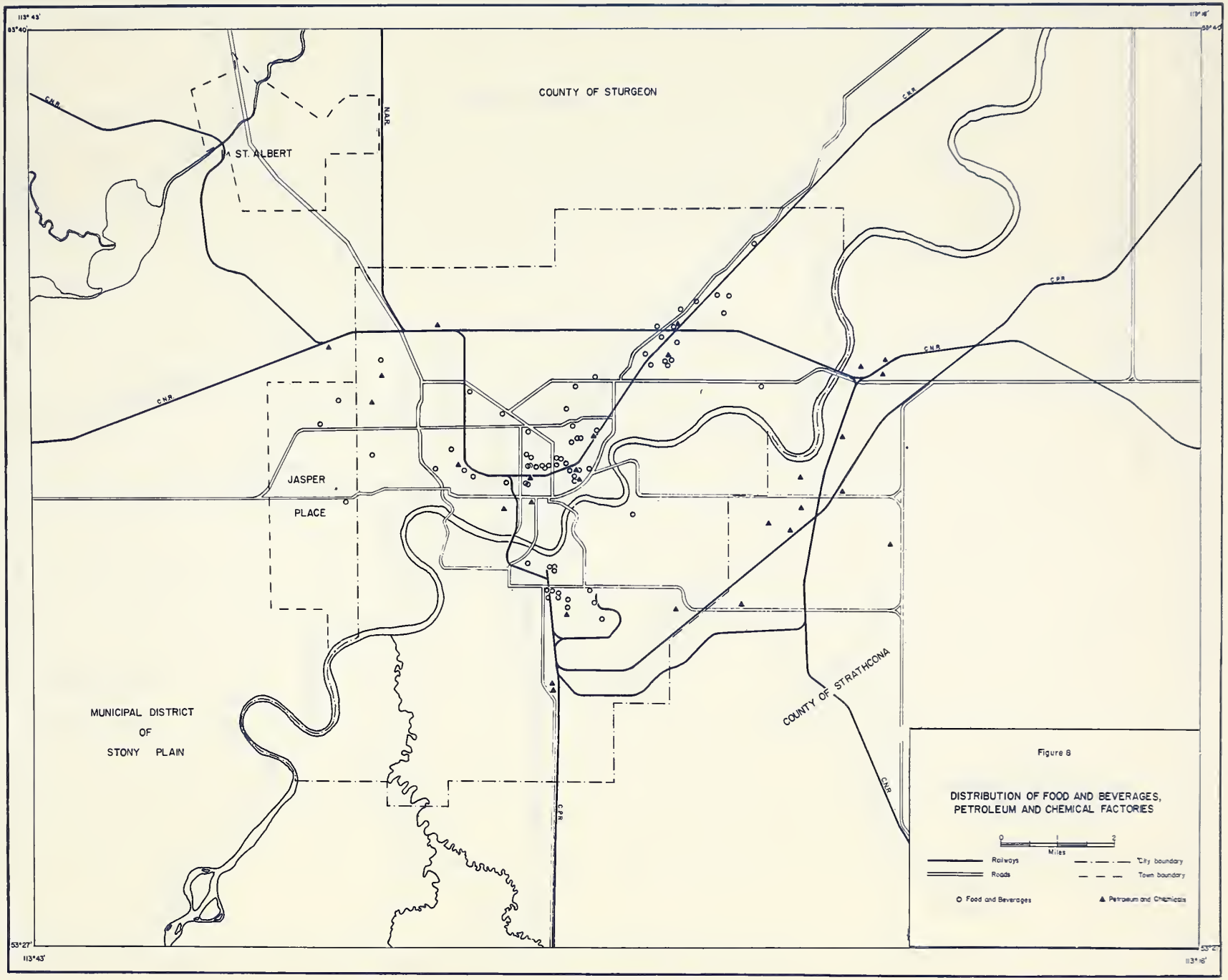
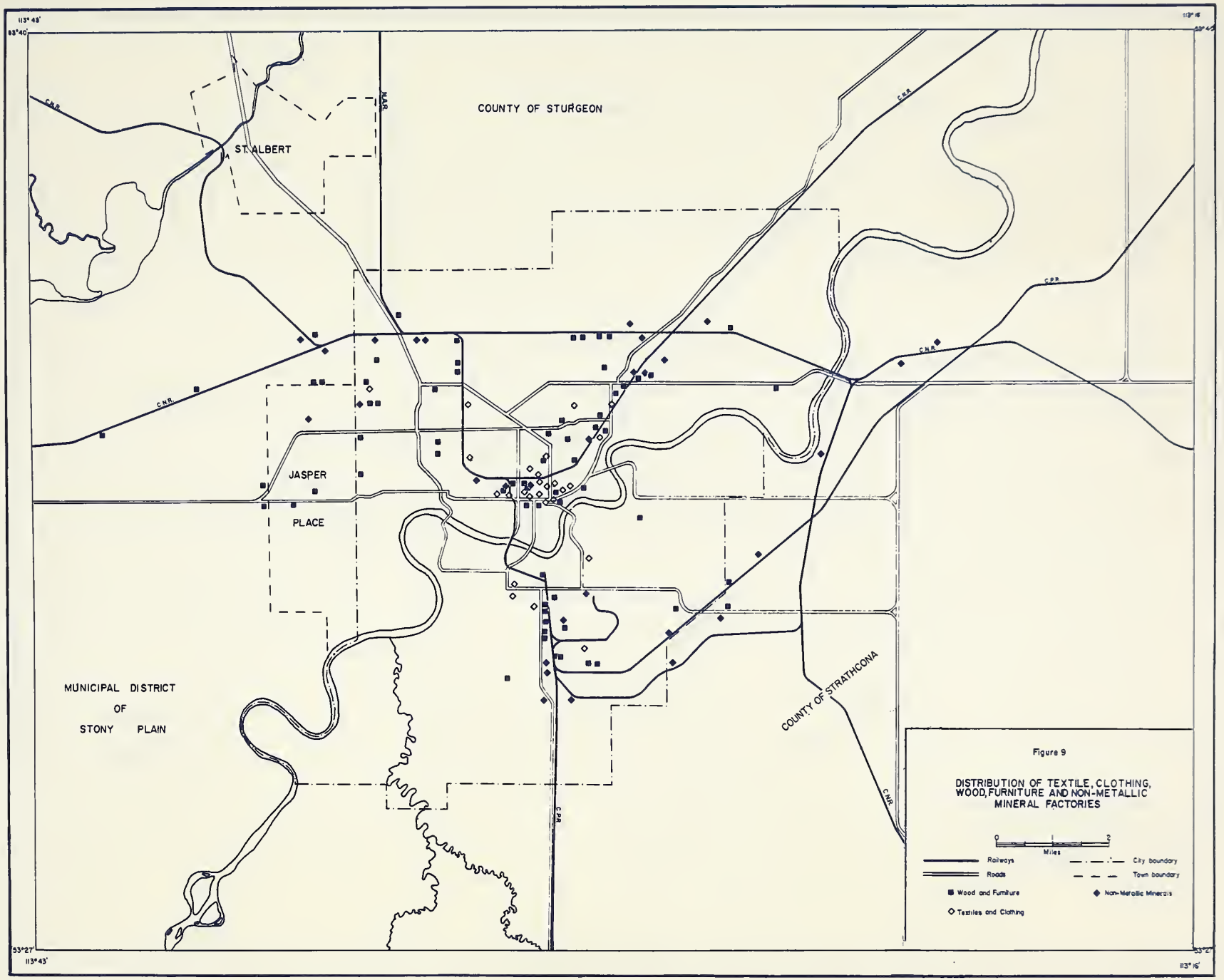
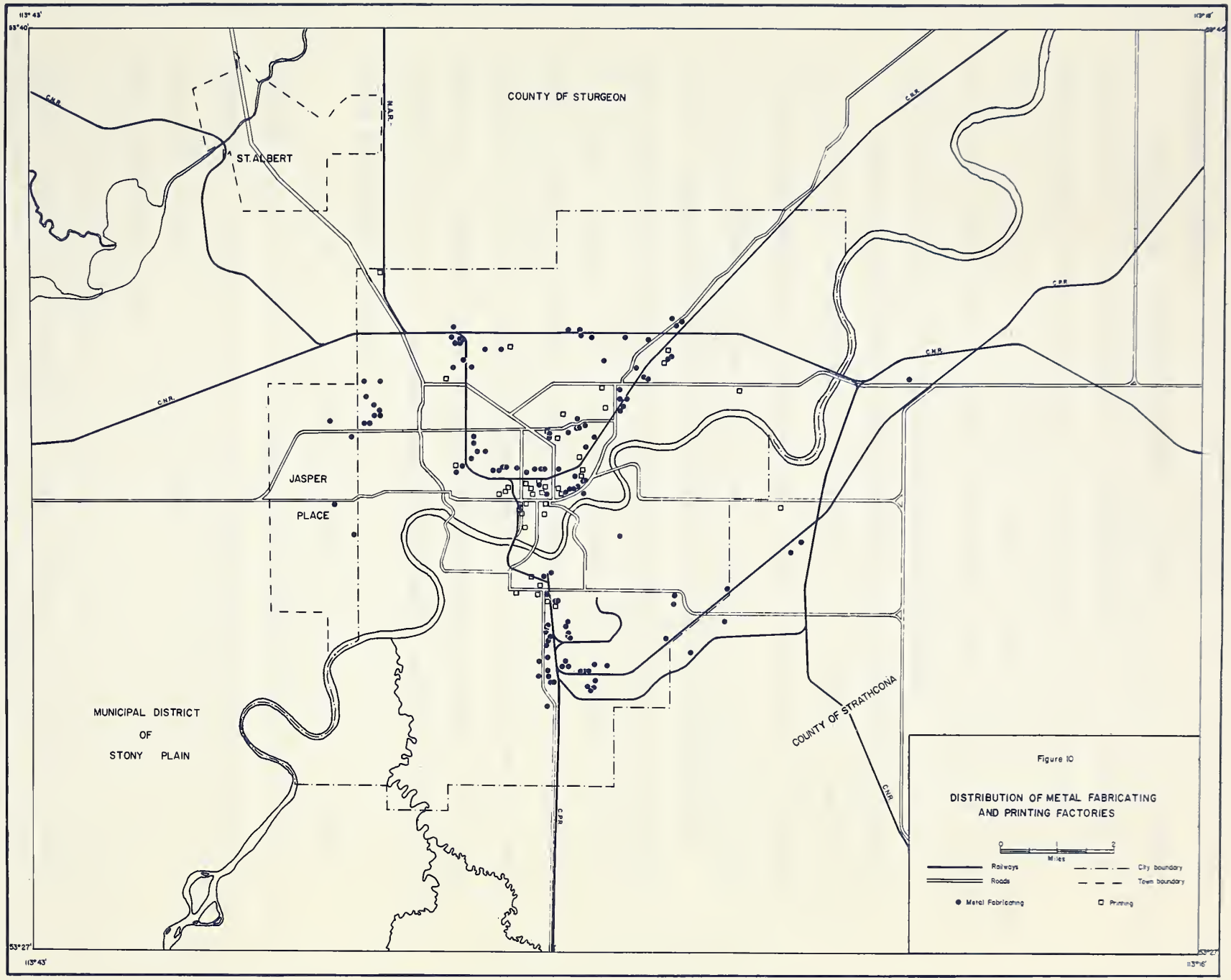
[8] Further study involving the collection and analysis of additional data made it clear that the Northwestern district could be divided into two districts. One, an inner area, along the main C.N.R. line north from the main station to Calder Yards (Fig. 7) and the other to the west of the St. Albert Trail. It has been decided to treat these two areas as one for the purpose of this present chapter.


COUNTY OF STURGEON
ST. ALBERT
N.A.R.
C.N.R.
JASPER
PLACE
MUNICIPAL DISTRICT
OF
STONY PLAIN
COUNTY OF STRATHCONA
C.P.R.
Figure 8
DISTRIBUTION OF FOOD AND BEVERAGES,
PETROLEUM AND CHEMICAL FACTORIES
0 1 2
Miles
Railways
Roads
City boundary
Town boundary
Food and Beverages
Petroleum and Chemicals


COUNTY OF STURGEON
ST. ALBERT
JASPER
PLACE
MUNICIPAL DISTRICT
OF
STONY PLAIN
COUNTY OF STRATHCONA
C.N.R.
C.P.R.
N.A.R.
Figure 9
DISTRIBUTION OF TEXTILE, CLOTHING, WOOD, FURNITURE AND NON-METALLIC MINERAL FACTORIES
0
1
2
Miles
Railways
Roads
City boundary
Town boundary
Wood and Furniture
Non-Metallic Minerals
Textiles and Clothing


COUNTY OF STURGEON
ST. ALBERT
N.A.R.
C.N.R.
C.P.R.
JASPER
PLACE
MUNICIPAL DISTRICT
OF
STONY PLAIN
COUNTY OF STRATHCONA
Figure 10
DISTRIBUTION OF METAL FABRICATING
AND PRINTING FACTORIES
0
1
2
Miles
Railways
Roads
City boundary
Town boundary
Metal Fabricating
Printing

The Central District

The Central district stretches from 100th Avenue north to 107th Avenue and from east of 101st Street to 111th Avenue (Fig. 7). The eastern and western boundaries are 91st Street and 116th Street, respectively. It includes the central business district and the areas of mixed land use which surround it. There are no parts of the district which are solely concerned with manufacturing; other uses are constantly intruding.

Manufacturing operates under difficulties in this part of the city as services are not specifically provided for it. There is a general lack of space for expansion, storage, and for loading and unloading. Factories may share a street with many other uses. Along 98th Street, for example, north of Jasper Avenue, there are several factories, including Barry Sheet Metal Company and Northwest Tent and Awning Company, but also the City Police Station, a fire station, a number of restaurants and small shops. Housing is the major land use further away from the central business district but manufacturing plants may be found in between dwellings (Fig. 11). Factories tend to be on the main traffic routes, such as 95th and 96th Streets which are basically ribbon retail areas, but they are also found in purely residential streets.

This is the only manufacturing district which uses the standard road pattern. The size of the blocks are a further deterrent to the larger factories. No effort has been made to improve this area for manufacturing use as the intention is to exclude manufacturing and industry in general from the centre of the city.

It would be expected that this part of the city attracts certain types of manufacturing, especially those industries which can be housed in any building, require only small amounts of land and which employ

small numbers of workers but with a high employee density. These include such industries as printing, clothing and small metal workshops which are typically found in the downtown area. In Edmonton nearly all printing works are found here (Table XVI). Similar small specialist industries are plants producing confectionery, flavourings ,and one factory blending tea and coffee. Tailoring establishments and leather factories are also attracted to the central area. More surprisingly, most of the larger bakeries and dairies are in this district, against all the tenets for the siting of these factories. Every manufacturing group found in Edmonton is represented in the Central district with the exception of the production of primary metal goods. Those, however, which normally require a great deal of land are not represented in any number.

TABLE XVI - DISTRIBUTION OF MANUFACTURING FIRMS IN EDMONTON, BY DISTRICTS AND STANDARD INDUSTRIAL GROUPS, 1961

Industry	No. of Factories				
	Central	North -western	North -eastern	Southern	Strathcona
Food and Beverages	18	6	17	12	-
Leather	3	-	1	-	-
Clothing & Textiles	19	3	4	5	-
Wood	6	7	8	6	2
Furniture	13	11	8	6	-
Paper	2	-	3	1	1
Printing	30	3	3	6	-
Primary Metals	-	1	2	2	2
Metal Fabricating	21	22	15	37	3
Transport	4	8	3	1	-
Electrical	-	11	-	1	-
Non-metallic minerals	3	7	7	11	3
Products of Petroleum & Coal	1	-	-	-	3
Chemical	6	3	-	5	8
Miscellaneous	10	3	-	5	3
Total Number of Firms	136	87	74	96	25

Source of Data: City of Edmonton, Industrial Directory, 1961.
Edmonton District Planning Commission.

The largest area occupied by any firm surveyed was 150,000 square feet for W. H. Clark and Company's lumber yard; in the outer parts of the city a lumber yard may occupy over 500,000 square feet. That its location is in disharmony with its requirements is suggested by the cramped conditions under which it is forced to operate. The majority of factories studied had an area of less than 10,000 square feet with an employee density varying from one employee to 200 square feet to one to 795 square feet. Only three firms had over 1,000 square feet per worker, and this of course included the lumber yard. The usual number of workers to each plant is low, often less than twenty and the largest firm employs fewer than one hundred workers. The small size of the individual factories is also partially due to the high value of land. The assessed values of a city lot in this area may be as high as $20,000 - $30,000.[9]

Most of the factories are small single-story buildings; some are of wooden construction. A few occupy multi-storey premises often sharing them with other occupants. These may be other manufacturers, or, more often commercial firms. In a few cases the remainder of the building is used for residences. There is a general lack of off-street car parking facilities and downtown office workers park their cars in many of the streets immediately to the east of the City Hall.[10] This aggravates an already difficult traffic problem. The factories front directly onto the street and many only have a very restricted yard space at the rear. Loading and unloading at the factories adds another hazard to the congestion already found in the streets.

The area which has been defined as the Central district is approximately

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[9] The assessed value of the land is the value assessed by the City of Edmonton for taxation purposes. It is normally approximately two-thirds of the market value of the land. A lot, in the centre of Edmonton, varies in area from 7,500 to 4,950 square feet.

[10] Parking is a very significant factor with the high rate of private vehicle ownership in Edmonton. In 1959 there were 38.75 cars for every one hundred persons, City of Edmonton, General and Administrative Statistics of the City, 1960, p.36. There is a considerable variation from factory to factory in the use of private vehicles. This appears to depend on the location of the

the area of the city before the First World War. It might, therefore, be expected that many of the older manufacturing firms in the city would be sited here and the analysis of the dates of establishment supports this expectation. Over one-third of the factories surveyed were established before 1914; 1925, the mean date for the establishment of factories in this area, is the earliest of the five districts.

The Northwest District

The Northwest district extends from 194th Avenue north along the C.N.R. to the point where the railway turns west. It is here that a break in development occurs. Manufacturing activity resumes to the west of 142nd Street and extends beyond the city boundary into Jasper Place and the County of Sturgeon River (Fig. 7). There is an eastward extension at 125th Avenue into the land between the C.N.R. yards and the Municipal Airport.

The district is very mixed in both the type of manufacturing and the age of establishment. The oldest factories are to the south, to the north of 104th Avenue. Three relatively large factories were built here in the 1920s, Molson's Edmonton Brewery, Alexander's Bag and Barrel Company and the Dominion Bridge Company. North of this is an area of small manufacturing firms along both sides of the C.N.R. Both this area and the newer industrial zone along the city boundary is characterized by small to medium size factories engaged predominantly in the wood, furniture and metal working industries (Figs. 8-10). There are also a few establishments representing food and beverages, clothing and printing. Immediately outside the city boundary, (Figs. 8-10) to the north of the main C.N.R. line west,

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factory in the city and the relationship between the number of male and female workers; see Appendix II.

there is a small concentration of larger factories. These nuisance industries include a cement plant and a plywood factory, although the reason for the location of the cement works, is not separation from other uses but the presence of a clay deposit which is used in the production of cement. Coincident with the Northwest districts although in no other respect really part of it, is the aircraft repair factory of Northwest Industries Limited. It is sited to the north of the Municipal Airport with isolated buildings in other parts of the airport's grounds. This is one of the largest factories in the city and its buildings dominate the airport. There are other small manufacturing firms within the airport occupying surplus hanger space. Some of these are not at all connected with air transport, including a printing and small ornamental iron works.

The differences in this district are reflected in the varying form of manufacturing within it. There is one small area which is older than the rest of the district. This is the area, immediately to the north of 104th Street, occupied by large factories, including Dominion Bridge Company and Molson's Edmonton Brewery. These factories front directly onto the street and there is a lack of space for loading and unloading and for expansion. In common with the other older manufacturing areas, this lack of space reflects the insignificance of road transport when the factories were built. Flanking this area to the north, is the Prince Rupert Industrial Estate (Fig. 11). The estate is largely occupied by wholesaling enterprise but there is some manufacturing. The factories include Northwestern Toni-Lynn, sports clothing, and the Alberta Bedding Company. This estate is well laid out and there is a buffer park between it and adjacent residential areas. The buildings are almost entirely single storey and of brick or concrete construction.

There are other industrial subdivisions or estates in the extreme northwest, beyond the St. Albert Trail.[12] These areas are only partly developed but are typified by small single-storey buildings with a mixture of manufacturing and wholesaling activities. There are good rail and road facilities and an attempt has been made to shield neighbouring residential area from industry. Beyond these estates, again, is the area of nuisance industries which is dominated by the factory of the Inland Cement Company. Here, as in other areas on the edge of the city, the overall impression is dominated by the amount of space available for industry. The factory buildings are spread over a large area although cement manufacture requires a concentration of activity into high buildings; the kilns and storage silos.

Outside the industrial subdivisions proper, there are some factories along the main traffic routes, especially 118th Avenue. These include prestressed concrete products factories, furniture works and sheet metal shops. There are fewer examples of this type of site than in other parts of the city, particularly the Northeastern and Southern districts.

The general age of development of the Northwestern area is much more recent than that of the Central district. The main date at which plants were founded is 1951, and only those in the 104th Avenue area were operating prior to 1940.

The size of plant is greater than in the Central district. The range is from just under 50,000 square feet to over one million. No factory has less than 1,000 square feet for each worker and the extreme is over 20,000 square feet; if the clay pits of the Inland Cement

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[12] For the purposes of this study these estates have been combined under the one name, Dominion (Fig. 3).

Company were included in its area the density would even be lower. The assessed value of industrial land in this part of the city ranges from $6,000 to $7,000 an acre in the newest industrial subdivisions to over $25,000 for the industrial lots between 119th Street and the C.N.R.

TABLE XVII - COMPARISON OF THE PERCENTAGE OF MANUFACTURING FACTORIES AND INDUSTRIAL EMPLOYMENT IN THE MANUFACTURING DISTRICTS, 1961

District	Percentage of Total Manufacturing Factories	Percentage of Total Industrial Employment
Central	32.6	14.3
Northwest	20.7	21.1
Northeast	17.7	25.9
South	23.0	21.2
Strathcona	6.0	13.8

Sources of data: City of Edmonton, Planning Department.
———————, Department of Industrial Development, Industrial Directory, 1961.

Northeastern District

This district and the Central district are the oldest of the manufacturing districts. The Northeast first came into prominence with the arrival of the railways. Today the district extends from 91st Street along the main C.N.R. line to the northeast. The major concentration of development is between 120th and 130th Avenues around the junction of the two C.N.R. lines which enter the city through Clover Bar and Fort Saskatchewan, respectively. There are, as well, a few scattered factories along the Fort Trail and to the north of Beverley (Figs.8 - 10).

The district is dominated by the meatpacking industry. The plants occupy a considerable amount of land and have old, multi-storey, rather

i. North West Tent and Awning is one of the few multi-storey factories, in the downtown area. The building is also occupied by other businesses. To the left is the central police station.

ii. The only lumberyard, W. H. Clark, in the Central district. The yard occupies a restricted area and there is much congestion.

iii. One of the older wooden factory buildings still found in the downtown area. This one is occupied by a small clothing concern. To the left is a small factory beneath apartments.

iv. Many factories in the Central district lack yard space and are congested, similar to the above factory on 98th Street.

v. Signs showing the multiple use of the Municipal Airport.

vi. A small factory in one of the newest industrial subdivisions, Dominion Estate.

vii. A pre-stressed concrete products plant on 118th Avenue, typical of the industries found along the major traffic routes.

viii. Burn's and Company's meatpacking plant is flanked by houses to the south. The residential streets are extensively used for parking by the workers at the factory.

ix. Swift Canadian is the largest meatpacking plant. Large car parking facilities are essential; even so cars are parked on the street. Rail crossings, as in the foreground, cause obstruction on many industrial roads.

x. An older industrial street, Stadium Road, occupied by light industries, not all manufacturing. The railway parallels the road at the rear of the factories.

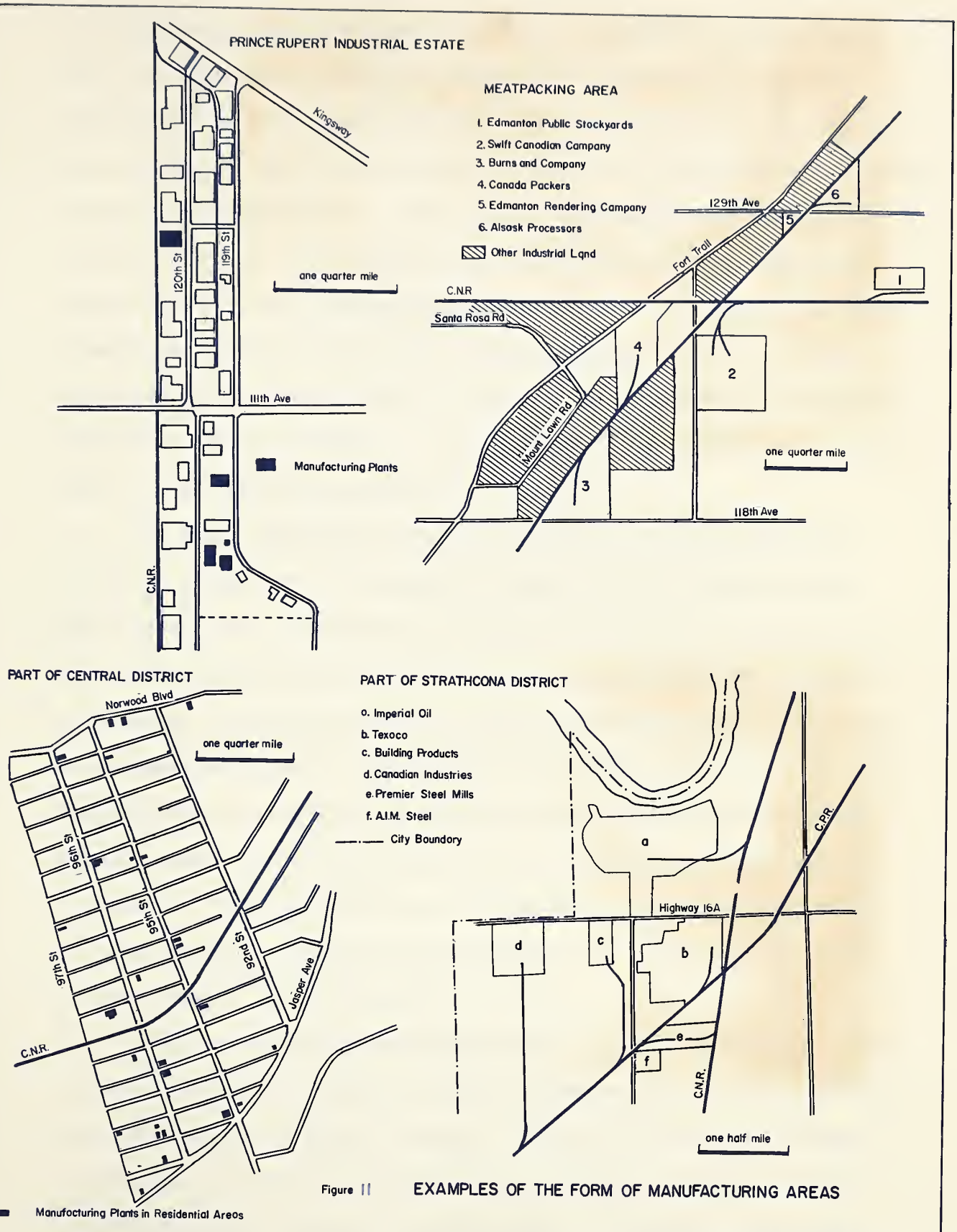

Figure 11 EXAMPLES OF THE FORM OF MANUFACTURING AREAS

NOTE: Maps are at different scales

forbidding buildings. The plants are in close proximity to one another (Fig. 11) and share a number of common services, including effluent disposal. Within the factory there is need for much space to age the meat and outside, stockyards are necessary to hold cattle and hogs for slaughter. The processes undertaken in a meatpacking plant produce unpleasant odours and much effluent. This is sufficient a problem to require separation from residential uses, even other manufacturing, and to depress the value of adjacent industrial land to the lowest levels in the city. To the east of the meatpacking plants is a large area where cattle and sheep are kept and fed before slaughter. These "feedlots" are another unattractive aspect of the meatpacking industry.

The whole meatpacking complex, the primary slaughtering plants, the rendering factory, the stockyards, feedlots and associated services form a distinctive, if unpleasant, feature in the urban landscape: one of the most apparent marks made by manufacturing on the total geography of Edmonton. Despite the need for isolation, residences come very close to the meatpacking plants, especially to the south of Burn's and Company's factory. In the newer residential areas to the east of the meatpacking plants a buffer zone of open space has been left between the plants and the houses. The proximity of heavy and obnoxious manufacturing industry has had a depressing effect on housing and on the old commercial centre of the village of North Edmonton.

The remainder of manufacturing in this district is very similar to that found in the other suburban areas with the emphasis on wood products, metal working and prestressed concrete. These factories avoid the meatpacking area on the whole although some are found to the east of Burn's meatpacking plant, between it and 67th Street (Figs.8-10). Most of the

factories are along the two railway lines which run through this district, one southwest to the city centre and the other west to the main C.N.R. yards. The factories are strung between the railways and the streets paralleling them whether the rail facilities are used or not. The factories are normally single storey structures, although there are a few older multi-storey buildings. In general there is ample space but congestion becomes a problem nearer to the city centre. Congestion and the lack of space is reflected in the absence of car parking facilities. Along Stadium Road manufacturing workers use the parking lots of Clark Stadium.

The largest employer in the Northeastern district apart from the meatpacking plants, the Great West Garment Company, has, however, the least parking problem; most of its 700 workers are women and use public transport. Access to the public transport system was one of the major considerations in siting this factory close to the centre of the city.[13] This has meant that a more restricted site than would otherwise be desired has been chosen. The large single-storey building is flanked on two sides by houses and is separated from the railway by a group of small warehouses so that all transport must, in the first instance, be by truck.

The Great West Garment Company also has the highest employment density in the Northeast district, 155 square feet to every worker. The rest of the firms questioned have a density varying from one worker to 2,000 square feet to one to 6,000 square feet. These figures do

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[13] Pers. Comm., the Plant Manager, Great West Garment Company, December, 1962.

not include the meatpacking plants for which statistics were not given upon enquiry but the density would probably be in the region of one worker to 1,000 square feet.

The packing plants are amongst the oldest manufacturing concerns in Edmonton, two of them being built before 1914. There are also a number of other firms of long standing some of which moved here from original buildings in the downtown area. The mean date at which the factories here were founded is 1931, only six years later than the Central district. Despite the general age of development there is an absence of congestion although the number of railway crossings and the density of rail traffic causes some difficulty around the meatpacking plants.

Southern District

The original nucleus of manufacturing on the south side of the river, called here the Southern district, grew up at the railhead of the C.P.R. line from Calgary, when Strathcona was an independent settlement. Most of the factories continue to be sited along the railway although there has been an expansion away from the main line, to the south (Fig. 8-10). Here there is a new industrial subdivision, Coronet, stretching from the Calgary Trail to 91st Street; much of it remains undeveloped at the present.

The Southern district has a more diversified industrial structure than the two suburban manufacturing districts on the north side of the river. This is, perhaps, partially a reflection of the independent settlement of the south side of the city. In recent years there has been a concentration of establishments here, engaged in various aspects of the oil industry. This has attracted small manufacturing plants, mainly in the metals industry, including, valve makers, pipe firms, manufacturers of general

oilfield equipment and sheet metal goods, especially tanks, to supply their needs (Figs.8 - 10).

The requirements of these establishments for factory space has been met in some cases by the construction of blocks of buildings for rent, by developers. Such buildings are found along the major traffic routes, the Calgary Trail and 63rd Avenue. These sites have some of the highest assessed values of land used by manufacturers. The assessed values reach over $11,000 an acre and in certain positions assessment is on a foot frontage rather than an acreage basis. These values are markedly higher than the $6,000 to $7,000 assessed value an acre for serviced industrial sites away from the main highways.[14]

The overall appearance of the manufacturing zone is very similar to that found in the suburban areas discussed in the two preceeding sections of this chapter. One difference is the almost continuous development south from Saskatchewan Drive to 63rd Avenue and then east to 91st Street. Factory buildings are not so isolated as in other parts of the city; there is continuous factory development to a much greater extent than elsewhere. The age of the factory buildings tends to get younger the further the distance from the original nucleus of Strathcona around the C.P.R. station of Whyte Avenue. The older part of the district lies between 104th Street (Calgary Trail) and the C.P.R. There is still vacant land here and the general standard of buildings is rather low. It forms a contrast with the new Coronet industrial subdivision. This is marked by modern well built factories although there is a large amount of

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[14] Serviced industrial sites are those sold supplied with utilities: water, gas, electricity, sewage and roads.

vacant land. Even along the southside of 63rd Avenue there are large amounts of open land. Along the main roads the factories are smaller than in the industrial subdivision, itself. The only larger factory is that of the Continental Can Company.

There are some important variations from the general pattern of manufacturing which can be traced to the growth of Strathcona at the beginning of the century. The largest factory in the Southern district, Gainer's meatpacking plant, is isolated from the rest of the manufacturing enterprises. Its site, in the Mill Creek Ravine, is a relict of conditions which no longer apply, access to the Edmonton Yukon and Pacific Railway, and today, it is very likely that the entire ravine would be zoned for parkland and recreational use. Similar relict sites are occupied by the factories producing livestock feed and the brewery on Saskatchewan Drive. The storage elevators of the feed factories are the most conspicuous features of manufacturing seen from the centre of Edmonton. They were built at the turn of the century. The brewery, particularly, operates under considerable disadvantages. The buildings of the Bohemian Maid Brewery are terraced up the valley side and the city insists that they must harmonize with the park which surrounds the factory. Coupled with this are difficulties of access for transport due to the arrangement of the buildings down the valley side. The one redeeming feature of this site would appear to be the superb advertising position of the factory, visible from a large portion of the central business district.

Despite the existence of several firms established during the days of Strathcona, the average date of the founding of the factories on the southside is 1950, comparable to that of the Northwestern district. The employee density was most variable amongst the firms questioned, possibly

due to the generally small size of the factories and the wide variation of activities.

Strathcona District

In contrast to the Southern District, this is the most specialized of all the manufacturing districts in Edmonton. It includes almost one half of the industrial land in the metropolitan area (Fig. 10) and is also the newest of the industrial districts. The mean date for the establishment of plants was 1953 and none was built before 1949. The whole is a development on a different scale from the remainder of manufacturing in Edmonton.

The district stretches from north of Highway 16, west of Clover Bar (Fig. 10), southwest to the city boundary in the vicinity of 50th Street. There are very few factories but those which are here are amongst the largest in Edmonton. The majority of them are closely interrelated through the common use of oil and natural gas products, (Fig. 11). The factories can be divided into two groups, the oil refineries and the petrochemical works. The latter are to some degree dependent on the former for their raw materials. Besides these, there are two large companies which have no direct connection with the oil and gas industry, Building Products Limited, making roofing and other paper products and Premier Steel.

The industrial landscape is dominated by the equipment of the petrochemical industry; the complex pattern of pipelines, tanks and stacks completely dwarfs the few low buildings which surround it. The only building which competes for attention with the catalytic cracking apparatus and the cooling towers is the structure which houses part of the continuous steel casting line at Premier Steel. There are few limitations on space and the factories are surrounded by vacant land both within and outside plant limits.

xi. The Canadian Bedding Company is one of the few companies, outside meatpacking, to occupy a multi-storey factory. This building originally belonged to the Northwest Biscuit Company. It has good rail access but is less accessible to trucks.

xii. One of the more unusual aspects of the Edmonton landscape are feed mills. This example is on the southern edge of the river valley, overlooking the centre of the city. The mill has both good rail and trucking facilities.

xiii. The Bohemian Maid Brewery occupies one of the most unusual sites of all Edmonton factories. Its buildings are terraced down the sides of the river valley. It is surrounded by the Queen Elizabeth Park.

xiv. These small factories are along 63rd Avenue, on a service road which parallels the main road. This is the northern edge of the Coronet industrial subdivision.

xv. A view of the Imperial Oil refinery showing part of the catalytic cracking and general refining plant.

xvi. A general view of Premier Steel's works, the tower houses part of the continuous steel casting line - the first in North America. Scrap unloading is in progress in the foreground.

The degree of association between individual factories, due to the use of common raw materials, is the greatest in Edmonton. The Canadian Chemicals factory, for example, is bordered by a number of satellite plants. These establishments, although owned by independent, often large national companies including Monsanto and Fiberglass of Canada, depend on the Canadian Chemical Factory for their raw materials and power.[15]

The district is crossed by three main highways and there is a good network of interconnecting industrial roads, maintained by the County of Strathcona. In addition there are good rail facilities (Fig. 11) and some factories are served by spurs from both railway companies.

The employee density in this area is the lowest in Edmonton ranging from 5,000 square feet per worker to over 20,000 square feet a worker in the oil refineries and similar plants with a high degree of automation. Despite an expansion of activities in recent years there has been a steady decline of employment at Imperial Oil due both to the effects of automating processes not only in the refinery itself, but also in administration, reducing the number of office workers. Maintenance work of a general character has been sub-contracted reducing the number of workers actually employed by the firm at the factory. This situation would also appear to be true of similar factories in the area, British American Oil and the Texaco refineries and the petrochemical factories of Canadian Industries and Canadian Chemicals.

This district produces approximately one quarter of the value added

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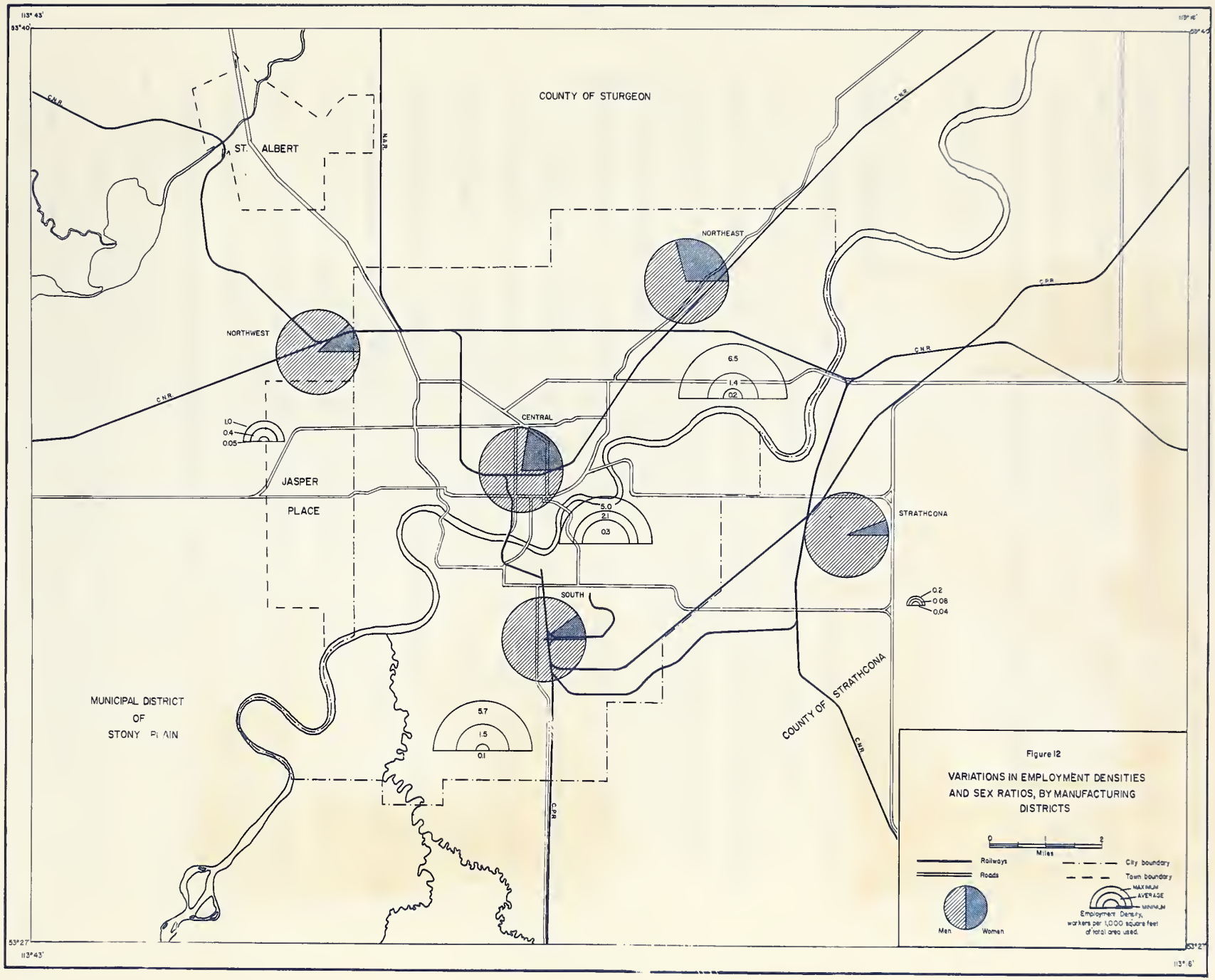
[15] Pers. Comm., Mr. Demco, Personnel Superintendent, Canadian Chemical Company, March 20, 1963.


113° 43'
53° 40'
COUNTY OF STURGEON
ST. ALBERT
C.N.R.
N.A.R.
C.P.R.
NORTHEAST
NORTHWEST
CENTRAL
SOUTH
6.5
1.4
0.2
1.0
0.4
0.05
5.0
2.1
0.3
JASPER
PLACE
STRATHCONA
0.2
0.08
0.04
MUNICIPAL DISTRICT
OF
STONY PLAIN
5.7
1.5
0.1
COUNTY OF STRATHCONA
53° 27'
113° 43'
113° 6'
Figure 12
VARIATIONS IN EMPLOYMENT DENSITIES
AND SEX RATIOS, BY MANUFACTURING
DISTRICTS
0
1
2
Miles
Railways
Roads
City boundary
Town boundary
MAXIMUM
AVERAGE
MINIMUM
Men
Women
Employment Density,
workers per 1,000 square feet
of total area used.

by manufacturing in Edmonton but it employs only 6.8 per cent of the manufacturing labour force. It is the only area of the city where modern large scale manufacturing is prominent but even here there have been no new large plants built since 1956. It is perhaps significant that many national companies have small, almost pilot, plants in this part of the city but none seem to have any plans for expansion in the immediate future.

Other Relationships

The pattern of manufacturing districts which has been outlined in this chapter, is not the only pattern which can be observed. The present arrangement of manufacturing in the city could be interpreted in a different form. The districts which have been delimited all contain different ages and types of development. It is possible to outline districts based on such criteria as age and type of manufacturing.

This new pattern leaves the boundaries of the Central district, as it is defined earlier in this chapter. The remaining districts inside the city boundaries, the Northwest, the Northeast and the South are broken down and regrouped into concentric districts defined as to whether the development was before or after the economic boom generated by the discovery and exploitation of the oil and gas resources. Finally, there will be three small, heavy manufacturing districts. These include the nuisance industries around the Inland Cement Company's factory, the meatpacking area and the petrochemical industries on the southeast edge of the city (Figs.8-10).

Such a division further illuminates the functional differentiation of the different parts of the city on the basis of manufacturing. This is

important and is reflected in the characters of the industrial districts through buildings, varying factory layout, the amount of land used, employee density and similar factors. The pattern, despite the different basis for the regional division, would not vary a great deal from that adopted here to discuss the areal differentiation of manufacturing in the city, although this is on a simple areal basis.

Despite this simple areal basis, the division adopted here is the most apposite for a geographical discussion of the nature of Edmonton's manufacturing. The manufacturing districts discussed in this chapter are locational and largely functional entities. Edmonton, unlike larger manufacturing centres with a fairly high degree of specialization, does not have a marked association between its manufacturing industries.[16] Nevertheless within the districts described here, common services are shared on a basic level. The services include rail facilities, the road network and general utilities. In two cases, the meatpacking complex and the whole of the Strathcona district, the association goes further. The stockyards and the rendering plant supply common services to all the meatpacking plants. Raw materials are exchanged, on their own pipeline network between the oil refineries and the petrochemical factories. It is these associations which make the areal division adopted in this study the most meaningful. There are more relationships between factories in the same district than between factories in the same industry in different

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[16] Industrial association or linkage is a close relationship between separate factories in any one location. It allows the development of the economies of scale by the specialization of individual plants on one particular stage in a manufacturing process. The factories will share common services and obtain many of the advantages of large scale operation while remaining relatively small units.

parts of the city.

Conclusions

Old and new industrial areas can be found in Edmonton as in most cities. Unlike the older manufacturing centres most of the older factories are still operated by their original owners. There are few older buildings capable of being used as "nurseries" for new enterprises. This is the probable reason for the small factories, very evident in the suburbs, built by speculators for rent to such establishments.

A definite pattern of manufacturing activity has arisen with the larger and heavier industries on the outskirts of the city, although one of these areas of heavy industry, meatpacking in the northeast, is now being surrounded by general urban development. The foresight shown in the siting of the stockyards, and with this the bulk of the meatpacking industry, at a distance of some two miles from the then city proper, has prevented many of the problems of mixed land use found in older cities. The foresight has been continued in the creation of the petrochemical area to the southeast of the present urban area.

The manufacturing activities in the city proper are characterized by mainly small and light industrial plants. The largest operation is a textile factory which is not incompatible with residential and associated uses. Heavy industry near the city centre is almost entirely limited to the production of pre-stressed concrete of various types.

The slow development of manufacturing industry in Edmonton and its recent importance and growth has enabled a situation to arise where manufacturing has been kept separated from other urban development. Almost by accident, only since the Town and Rural Planning Act, 1955 by design,

Edmonton has obtained what is a reasonable distribution of its manufacturing activities so that there is a general lack of conflict between manufacturing and other uses. Moreover the areal division into the five districts described in this chapter enables manufacturing concerns to enjoy the benefit of sharing some of the necessary basic services, which reduces the cost of providing these services for any one factory.

CHAPTER 5

THE LOCATIONAL ROLE OF EDMONTON'S INDUSTRY

Location theory has developed the concept of various preferences which govern the distribution of economic activity. The variation in the distribution of economic activity is of fundamental concern to the geographer interested in the areal differentiation of the earth's surface. The geographer is concerned to understand this distribution of economic activity and so must comprehend the forces which have operated to produce the existing distribution. Economic activity is normally considered as having three aspects, the procurement of goods, the processing of goods and finally the distribution of goods.[1] This paper, concerned with the geography of manufacturing, has a bearing mainly on the second of these activities; the processing of goods by manufacturing industry. The other stages must, however, be considered as they usually influence the location of manufacturing. The influence of the procuring of raw materials or the distribution of products is felt through transport and its associated transfer costs.[2] Other factors which may be significant in influencing location include variations in processing costs and economic interdependence between enterprises.[3] When a business man finally decides to build his plant in a certain city, the determining

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[1] E.M. Hoover, The Location of Economic Activity, New York, 1948, p. 7.

[2] Transfer costs are more than just freight charges. They include insurance, the variations in freight rate structure, and such intangibles as the inconvenience and difficulty of shipping long distances.

[3] The inter-relationships between various activities, Edmonton examples would include the relationship between oil-refining and petrochemicals and the dependence of much of the metal fabricating industry on the demands of the oil industry, as a whole, exploration, production and refining.

factors may be intangibles, or at least factors with no apparent economic influence, but the measurable and significant elements in the situation will already have been considered.

The problem with the application of location theory is the extreme difficulty of obtaining the necessary data. General railway freight rates, can be obtained, but the discretion given to the railway companies to negotiate rates in individual cases reduces the applicability of these rates. The number of trucking firms and their independence makes the comparison of costs even more difficult. In Canada, at the present, the situation is worsened by the high degree of competition between rail and truck transport which in the case of the railway companies has led to an extreme reluctance to release freight rates at all. In consequence of this, discussion of freight rates will be limited and the argument confined to a consideration of the distribution of markets, sources of raw materials and the labour supply. Other factors will be considered but the major emphasis will be on the three factors mentioned above.

EDMONTON, MANUFACTURING RELATIONSHIPS

The export manufacturing industries found in Edmonton receive most prominence when the manufacturing structure and development of the city is considered. They, however, account for only one-fourth of the total manufacturing activities performed in the city, and include a very restricted range of manufactures, meatpacking, petrochemicals and clothing. The remainder has grown up specifically to serve the needs of the metropolitan area and the surrounding region. Any products which find markets outside Alberta, in many cases outside Northern Alberta, are really incidental to

the choice of Edmonton as a location. The number of firms even having an Alberta market is small and this is reflected in the very similar manufacturing employment structure of Edmonton and Calgary (Fig. 6). The larger size of the labour force in Edmonton, 17,127 workers, in 1960, compared to 12,054 workers, can be attributed to the advantages Edmonton possesses over Calgary in relation to the distribution of the more productive agricultural land and the oilfields (Fig. 2).

The Attractions of the Market

The bulk of the manufacturing industries found in Edmonton supply primarily the local market provided by the city and its region. They produce those goods for which there is an effective local demand. Operations are performed in small factories and the activities performed can largely be classified as service manufacturing. The industries are attracted by two markets, the consumer market and the producer market. The most significant aspects of the latter are the demands of the oil industry, oil exploration and production, agriculture and construction, the latter, particularly within Edmonton, itself. Production for the consumer market is limited to food and beverages, furniture and clothing.

It would appear that manufacturing establishments can be divided into three groups, on the basis of their markets. The first of these, are the factories supplying over ninety per cent of their production to Northern Alberta, the second, those which supply seventy-five per cent of their products to Alberta as a whole and the last, the firms which have fifty per cent or less of their markets in the province (Table XVIII). In this present section consideration will be limited to the first two groups and the third will only be considered in relation to its degree of distinctiveness.

Firms supplying the Northern Alberta market tend to import at least half their raw materials from outside the province. This is particularly true of the printing, metals and furniture industries (Table XIX). The imported materials will normally be semi-finished goods which it is cheaper to obtain from large eastern producers than to manufacture locally on a much smaller scale.

The remainder of the establishments manufacturing for the local market obtain much of their raw materials locally. This is true of the meatpacking, wood products, other than furniture, and the refineries. All the meatpacking plants have the bulk of their markets in Alberta, with one exception. The Swift Canadian factory is limited to the north of the province, as the company has another plant in Calgary. Besides the local production most of the companies also supply fresh and prepared meats to Eastern Canada, British Columbia and the United States.

The division of the province into two market areas for manufacturing goods, one supplied from Edmonton and the other from Calgary, is a common occurence. The dividing line tends to be in the vicinity of Red Deer, with Red Deer, itself, in the Edmonton market area. This organization of the province is especially true when one company has factories in both cities, another example of which, besides Swift Canadian, is Imperial Oil. A similar division is also found between independent companies making the same products. The best example of this is the agreement between the Inland and Canadian Cement companies. The former establishes the prices north of Red Deer and the latter to the south. Prices are based on production costs plus the transport cost from the factory to the customer. If the Inland Cement Company wishes to sell in southern Alberta it must meet the prices set by the local producer, the Canadian Cement Company.

TABLE XVIII- PERCENTAGE DISTRIBUTION OF MARKETS BY AREA, FOR SOME EDMONTON FACTORIES

Industrial Groups	Numbers Employed	Percentage Distribution of Markets by Area				
		Northern Alberta	Southern Alberta	Rest of Western Canada	Eastern Canada	Export
Food and Beverages						
Factory 1.	14	50	5	25	5	15
" 2.	12	60	35	5	-	-
" 3.	57	80	20	-	-	-
" 4.	30	60	30	10	-	-
Textiles and Clothing						
Factory 1.	12	95	5	-	-	-
" 2.	50	55	30	15	-	-
" 3.	14	65	15	16	4	-
" 4.	38	60	15	24	1	-
" 5.	700	25	25	25	25	-
" 6.	15	30	30	20	20	-
Wood and Furniture						
Factory 1.	78	91	4	5	-	-
" 2.	5	100	-	-	-	-
" 3.	2	95	5	-	-	-
" 4.	12	100	-	-	-	-
" 5.	147	25	20	15	40	-
" 6.	40	25	25	50	-	-
Paper, Printing and Publishing						
Factory 1.	38	90	10	-	-	-
" 2.	6	99	1	-	-	-
" 3.	15	90	10	-	-	-
" 4.	16	100	-	-	-	-
" 5.	n.a.	45	30	25	-	-
Metal Products						
Factory 1.	13	95	-	5	-	-
" 2.	70	100	-	-	-	-
" 3.	7	100	-	-	-	-
" 4.	465	50	50	-	-	-
" 5.	3	95	5	-	-	-
" 6.	n.a.	90	10	-	-	-
" 7.	7	13	12	25	50	-
" 8.	11	75	25	-	-	-
" 9.	17	100	-	-	-	-
Non-Metallic Minerals						
Factory 1.	50-150	100	-	-	-	-
" 2.	37	100	-	-	-	-
" 3.	185-245	50	33	17	-	-
" 4.	96	100	-	-	-	-
" 5.	41	95	5	-	-	-
Petroleum and Chemicals						
Factory 1.	7	97	3	-	-	-
" 2.	385	90	-	10	-	-
" 3.	327	-	-	20	40	40

The firms which have at least half of their markets outside Alberta are in similar industrial groups to those discussed in the preceeding paragraphs, but are all peculiar in some way. The firms in turn, can be subdivided into two groups. The establishments using local raw materials and those using materials brought from outside the province. The first group includes, petrochemicals and meatpacking plants, the second, clothing factories. The products of the two groups tend to be very specialized. All have their major markets in North America although two have regular overseas customers, Alsask Processors horse meat packers and the Canadian Industries terylene plant. The beef and pork packing plants and the Imperial Oil refinery, also have significant markets outside the province, although this amounts to only a small proportion of their total production.

The large proportion of the manufacturing activity in Edmonton which is directly due to the demand generated in the metropolitan area and the Northern Alberta region (Table XIX) is such that only those industries with their markets outside the province can be considered basic. Basic, that is, in the sense of the basic/non-basic concept of the urban economy.[4] The close links between the city and the larger region in which it lies make it difficult to otherwise distinguish the basic and non-basic sectors of the manufacturing economy.

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[4] The basic/non-basic concept or urban economic functions distinguishes between those activities which serve the population of the city or region being studied and those which are "exported" outside this area. Fundamentally the concept is used to distinguish those services, basic activities, which a city performs for its region from those serving the city population. In the case of Edmonton this region would be Northern Alberta. It can also be used to separate out those activities which serve a wider market than either the city or the region, in this example this would be markets outside Northern Alberta.

Raw Material Associations

The sources of the raw materials of Edmonton's manufacturing industry have already been considered in relation to the market associations of the industry. In this section the influence of the nature of the raw material sources on manufacturing will be further discussed.

A broad generalization on the sources of raw materials can be made on the basis of the size of operation. The larger establishments, those employing more than 100 workers, with a few exceptions draw their raw materials from Northern Alberta. This is true of the oil, petrochemical and meatpacking factories, which obtain oil, natural gas and livestock from the northern half of the province and are the largest manufacturing concerns in Edmonton.[5] The smaller factories tend to purchase more of their raw materials from outside the province. Basically these materials are semi-manufactured products, sheet steel, paper, cloth and similar goods. These establishments finish partly finished goods, often for a particular order. Their products clothing, sheet metal goods and printing, are such, that there is need of an intimate relationship between the manufacturer and the customer. This can only be obtained by local operation.

Plants which process mineral or agricultural products use largely Alberta raw materials. The industries using mineral products include not only the oil and petrochimical industries but also cement and concrete products. In the latter case the materials have already been partially processed. All these industries use bulky raw materials and process them into similarly bulky goods: petroleum, cement and prestressed concrete, for example. These goods are those which cannot,with the exception of

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[5] Burn's and Company, one of the meatpackers, besides purchasing from the stockyards and a south Edmonton buying station, have other buying stations in Lloydminster, Coronation, Lacombe and Grande Prairie. Pers. Comm., Mr. Parker, Livestock Manager, Burn's and Company, November, 1962.

petrochemicals, stand the cost of long distance transport and so enjoy a naturally protected market in the province. Even in Alberta their market area is restricted so that in such industries, as meatpacking and concrete products, competition with Calgary is not practical.

The industries so far discussed have been started to a large extent because of the demands of the local market. There are other firms which have been attracted solely by the availability of certain raw materials. These are mainly the petrochemical factories although two units of the meatpacking industry and a plywood plant can also be included. The petrochemical factories have the most restricted raw material sources of any industries in Edmonton. Canadian Industries' polyethylene plant uses natural gas only from the Leduc-Woodbend field while Canadian Chemicals, producing terylene and other chemicals, use feedstock purchased from the refineries. The two meatpacking plants, the Edmonton Rendering Company[6] and Alsask Processors also draw raw materials from a limited area. The rendering factory uses the by-products of the slaughtering and packing plants, which draw their livestock from Northern Alberta. Alsask Processors, horse meat packing plant, buys horses primarily from Alberta and Saskatchewan although some come from Montana. All their markets lie outside the province; half of their meat is sold for human consumption to Europe and Japan. The plywood undertaking, Western Plywood, obtains its wood from Northern Alberta but over half its markets lie outside the province.

The power of raw materials to attract manufacturing has been strong in Edmonton and the major manufacturing activities, at least in part, can be attributed to this. The factor of distance and the isolation of the

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[6] The rendering plant processes animal wastes from the packing plants to produce fats, tallow, grease and neats foot oil.

city from the centres of economic life in Canada, is still a considerable disadvantage to manufacturing. It is still true that manufactured items are more expensive to transport than raw materials. The latter can often be shipped in bulk and so qualify for very low railway freight rates, rates which may be subsidized by the higher rates charged on smaller shipments. Manufactured goods often form less than a full railway car load. The low rates charged for the transport of raw materials has had a special impact on Edmonton since the building of the trans-continental oil and gas pipelines.[7]

The balance between the cost of transporting raw materials and the finished products is very significant. If this balance changes so do locational relationships and the distribution of manufacturing. Transport costs have changed in Canada to the benefit of manufactured goods but it would require a very large change for there to be a significant expansion in Edmonton's manufacturing industry. The major Canadian markets for manufactured goods are over 2,000 miles away and the nearest port, Vancouver, through which exports would have to pass, 900 miles to the southeast.

There are four establishments, the Great West Garment Company, Marsh Instrument and Valves, Stylemaster Apparel and R. J. Welsh and Company, which have overcome the disadvantages of high transport costs.

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[7] There are four major pipelines, two oil and two gas, from Alberta to the West Coast and Ontario.

(i) The Interprovincial Oil Pipeline which opened in 1950 and was doubled in 1958 and which is at present being further expanded.This pipeline runs from Edmonton to Sarnia and Port Credit, Ontario.

(ii) The Trans-Mountain Oil Pipeline was opened in 1953 and runs from Edmonton to Vancouver.

(iii) The Trans-Canada Gas Pipeline was opened in 1958 and runs from Southern Alberta to Montreal.

(iv) The Westcoast Transmission Gas Pipeline was opened in 1953 and runs from Peace River to Vancouver.

They import their raw materials, largely from Eastern Canada, and yet still manage to export from half to three quarters of their production. Only the Great West Garment Company is large and all produce rather specialized goods, work and casual clothing, riding leathers and thermometers and valves. The success of the Great West Garment Company is inexplicable in terms of its Edmonton location. The firm competes successfully with eastern rivals despite the overwhelming disadvantages, the lack of a labour force skilled in tailoring and the necessity to import all its cloth from Ontario and Quebec.

Problems of an Edmonton Location

The difficulties faced by manufacturing industry in Edmonton revolve around the small local market and the isolation of this market from the remainder of the country. It is the small market and the isolation, above all else, which prevents the expansion of the secondary manufacturing sector of the city's economy, except at a rate comparable to the rate of overall growth of the city's population. During only two periods, the later years of the Second World War and the boom of the early 1950s, has the manufacturing sector of the economy grown at a rate above that of the city's economy as a whole. Despite its recent increase the population of Alberta is just 1,330,000, a population which cannot generate a large enough demand to support manufacturing except on a very restricted scale. The market is sufficient to allow the usual economies of large scale production on only a few items.

The distance to other markets coupled with the relatively sparse population of Western Canada also hampers the development of secondary manufacturing. Not that the relative isolation is always a disadvantage,

TABLE XIX- PERCENTAGE DISTRIBUTION OF MATERIAL SOURCES BY AREA, FOR SOME EDMONTON FACTORIES

Industrial Groups	Numbers Employed	Percentage Distribution of Raw Material Sources by Area				
		Northern Alberta	Southern Alberta	Rest of Western Canada	Eastern Canada	Import
Food and Beverages						
Factory 1.	14	100	-	-	-	-
" 2.	12	90		10	-	-
" 3.	550	100	-	-	-	-
" 4.	800	100	-	-	-	-
" 5.	30	85	-	5	-	10
Textiles and Clothing						
Factory 1.	12	-	-	-	90	10
" 2.	50	1	-	4	90	5
" 3.	14	-	-	-	100	-
" 4.	38	-	-	-	85	15
" 5.	700	-	-	-	100	-
" 6.	15	5	-	-	35	60
Wood and Furniture						
Factory 1.	78	45	-	45	-	10
" 2.	5	-	50		remainder of sources unknown	
" 3.	2	3	50	-	30	17
" 4.	12	100	-	-	-	-
" 5.	147	95	-	5	-	-
" 6.	40	90	-	-	10	-
Paper, Printing and Publishing						
Factory 1.	38	20	-	-	60	20
" 2.	6	-	-	-	100	-
" 3.	15	-	-	-	100	-
" 4.	16	-	-	-	40	60
" 5.	n.a.	25	9	30	16	20
Metal Products						
Factory 1.	13	90		-	10	-
" 2.	70	80	5	-	-	15
" 3.	7	15	-	85	-	-
" 4.	465	25	-	25	40	10
" 5.	3	100	-	-	-	-
" 6.	n.a.	85	-	-	5	10
" 7.	7	-	-	-	-	100
" 8.	11	50	10	-	35	5
" 9.	17	-	-	-	100	-
Non-Metallic Minerals						
Factory 1.	50-150	90	-	-	5	5
" 2.	37	50	50	-	-	-
" 3.	185-245	100	-	-	-	-
" 4.	96	90	-	-	10	-
" 5.	41	-	95	5	-	-
Petroleum and Chemicals						
Factory 1.	7	60	10	-	20	10
" 2.	385	100	-	-	-	-
" 3.	327	100	-	-	-	-

the long hauls from Southern Ontario and Quebec give some protection to Alberta industry in the local market. The industrial structure, and the range of manufactured products are probably wider than if Edmonton were nearer to competing eastern manufatturers. The freight costs act as a sort of internal tariff barrier against competition from outside manufacturers. This is most obvious in the case of bulky goods. It is at least part of the explanation for the development of the steel industry based on local scrap supplies. In time, the same "protection" - distance and high freight rates - will probably allow the expansion of production from the present ingots and bars to sheet steel, as the local demand for the latter increases. The market served by Premier Steel Mills is now restricted to Alberta and Saskatchewan.

The plants, such as Canadian Industries and Western Plywood, which use local raw materials and export their products outside the province face great problems. They must not only overcome the added costs of long hauls to market but also the isolation from the major hubs of commercial activity in Toronto and Montreal. This has become a problem in the petro-chemical industry since the construction of the trans-continental pipelines allowing cheap transport, in large quantities, of oil and gas to Ontario. The original raw material advantages have gone and the Edmonton factory must compete with similar plants at the end of the pipelines in Sarnia or Toronto.

"The manufacturer of petroleum-based chemicals, for example, must now compete with low-cost materials available in Eastern Canada. These materials include natural gas and crude oil moved eastward at low cost and hydrocarbons shipped to Canada from a world that is now experiencing an excess petroleum capacity and as a result one of the principle incentives for manufacturing in Alberta has been removed. You can do in Sarnia or Montreal what you had ten years ago to come to Alberta for."[8]

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[8] L. Hynes, Economic Growth-Chance or Choice, 2nd Annual Meeting, Edmonton Area Industrial Development Association, February, 1963.

The relative isolation of Edmonton in respect to manufacturing in both Canada and the whole of North America, is reflected in other ways. There has been a large influx of population since the oil boom in the early 1950s but there are still too few skilled workers. This is particularly so where some special skills are required. At the Great West Garment Company, a six month training period is necessary for all operatives which naturally increases costs above those of a similar factory in Montreal or even Winnipeg where there is a larger garment industry and where a factory can draw on a pool of trained labour.[9] Similarly the chemical industry began operating in the city without the help of a local skilled labour force.[10]

Conclusions

Basically Edmonton is still a primary processing centre, "secondary industry in Edmonton involves at the present time a very small proportion of our industrial complex."[11] This proportion has been rising in recent years faster than the increase in the primary industries in response to the increased population which the latter have helped attract. The oil and petrochemical industries account for almost 2,000 of the increase in manufacturing employment since 1951. The bulk of this in primary manufacturing industry. This is almost a quarter of the total increase in

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[9] Pers. Comm., General Manager, Great West Garment Company, November, 1962.

[10] Canadian Industries Limited brought a large number of workers from an abandoned factory in Windsor, Ontario. Pers. Comm., with J. Bedard, January, 1963.

[11] E. M. Blanchard, A Wedge to Develop Secondary Industry in the Edmonton Area, 1st Annual Meeting, Edmonton Area Industrial Development Association, February, 1962.

the manufacturing labour force from 9,422 in 1951 to 17,127 in 1960. The remainder of the increase can be attributed to the growth of secondary manufacturing and the older primary manufacturing industry, meatpacking. The growth of the former is due to the increasing market offered by the larger populations of Edmonton itself,Northern Alberta and to a lesser extent Alberta as a whole. This is plainly indicated by the distribution of markets for the firms questioned (Table XIX).

The present character of manufacturing has been imposed largely by the position of Edmonton in regard to other markets and the relationship between the costs of shipping raw materials, semi-processed goods and the finished manufactured products, to and from Edmonton. It is only for the local Northern Alberta market, and to a much lesser extent, Southern Alberta, that Edmonton is a strategically located transfer node. On the larger scale of Western Canada, Edmonton's manufacturing must compete with the other prairie cities, especially Calgary. Calgary, on the more direct trans-continental rail route and the new Trans-Canada Highway, has superior connections with the major focus of the Canadian economy. Calgary is even more of a competitor within the province but Edmonton's advantages lie in its better relative position to the major sources of oil and livestock.

In certain ways, Edmonton, as a manufacturing centre has similarities to some of the larger cities of the western United States. The regional service centres of the interior United States, Denver and Minneapolis- St. Paul, and the west coast ports of San Francisco and Seattle, all have a similar proportion of their labour force employed in manufacturing activities as Edmonton. This put them, as a result of the 1950 Census, in the sixth

rank of American manufacturing cities.[12] Edmonton, in Alexandersson's classification, has only recently reached this rank. In 1951 it would have been in the lowest or tenth rank. The manufacturing sector of the city's economy has become much more significant during the last ten years. It is still difficult to determine the amount of this increase due to the influence of the oil boom and the amount due to a long term trend in the location of manufacturing industry in Canada.

It is the contention here that the oil boom was the most important although a long term change in the locational advantages offered to manufacturing by Alberta, and Edmonton in particular, is of some significance. The change in locational advantages is ultimately connected with the increasing population of Western Canada and in the case of Edmonton, specifically with the increasing population of Northern Alberta. It is still not generally practicable to supply the national market from an Edmonton factory.

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[12] G. Alexandersson, The Industrial Structure of American Cities, Lincoln, 1956, p. 12.

CHAPTER 6

THE POSITION OF MANUFACTURING IN THE GEOGRAPHY OF EDMONTON

Edmonton is the major service centre for northern Alberta and one of the two major service centres in the province. Its manufacturing is very much oriented to the province, its major market. Relatively few of the city's manufactured products are exported beyond the provincial boundary. The new industry which is being attracted to the city is tending to strengthen this situation. Within the city the overall trend is to a movement of manufacturing activity from the inner areas to the suburbs, although this is not so marked as in some older cities.[1]

The Objectives Reviewed

It is appropriate at this point to restate the objectives of this study and to try to assess the degree to which they have been achieved.

The objectives as stated in the introduction were:

1. To establish the nature and variable character of the present areal pattern of manufacturing;

2. To analyze the type of manufacturing found in Edmonton;

3. To examine the locational forces which have acted upon manufacturing industry in Edmonton.

The first has been attempted by the qualitative and quantitative description of the five manufacturing districts which can be identified

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[1] J. B.Kenyon, Industrial Localization and Metropolitan Growth, Paterson-Passiac District, Chicago, 1960, p. 210.

in Edmonton. These may be differentiated in terms of the type of manufacturing, the interrelationships which exist between the factories in each district, the age and form of individual factory buildings and the arrangement of the buildings which make up a factory or plant. They are in essence the outward physical expression of Edmonton's manufacturing complex.

Secondly, manufacturing in Edmonton, measured by the value added in manufacturing and by employment in manufacturing has been compared with that of Canada as a whole. From this comparison it can be seen that manufacturing in Edmonton serves the primary function of supplying the needs of the local market. Outside this role it is concerned with the processing of local resources, livestock, oil or natural gas, for other markets.

Finally the locational role of manufacturing in Edmonton was assessed by means of interviews and a questionnaire. This revealed the overwhelming importance to Edmonton's manufacturing industry, of the Alberta market, and of Northern Alberta in particular. The only other significant attraction was the local resources, oil, natural gas, livestock and, in one case, wood.

CONCLUSIONS

The conclusions which have been drawn from this study are here stated, briefly, and certain aspects are included in the discussion which follows. The conclusions are as follows:

1. The areal variations in the distribution of manufacturing in Edmonton are expressed in the differing character of five distinct manufacturing districts;

2. Manufacturing activity in Edmonton is becoming increasingly concentrated on the edge of the city;

3. Manufacturing industry in Edmonton is intimately connected with, and almost entirely dependant upon, the demands of the local market;

4. The local raw material resources have not, and will not, attract manufacturing on a large scale. The resources are, however, of importance in widening the range of manufacturing.

The Areal Distribution of Manufacturing

There are, in Edmonton, five distinct manufacturing districts. In this paper these have been named Central, Northwest, Northeast, South and Strathcona. These are characterized by their locations as districts in the city which in itself, gives them all a separate identity. More than this they are all unique in the areal arrangement of factories and other elements of the manufacturing landscape within them. In a few examples this takes the form of the existence of a manufacturing complex; meat-packing in the Northeast and petrochemicals in Strathcona. Elsewhere, the different arrangements of similar industrial functions and the use of common services in itself produces the differing characters of the five districts.

The districts, however, are subject to changes which are city wide, both in their origin and impact. There is a general tendency, as in many other cities, for manufacturing activity to move towards the suburbs. This change is achieved as new factories are established rather than by the movement of existing industry out of the central area. Moreover, the original distribution of manufacturing in the city was so dispersed that older manufacturing areas can still be found on the limits of the present urban area. Nevertheless the bulk of land now available for industry is on the outskirts of Edmonton. In view of the city and district

planning proposals little change in this situation can be expected.

The preliminary district plan envisages the removal of all manufacturing firms from the central area during the next twenty years. This, however, is not necessarily going to happen unless strong legislation enforces a move. Congestion has not reached such a level as to require establishments to move from the fringe of the central business district. Difficulty is, however, experienced by those manufacturing activities which require a relatively large site. Land is becoming so expensive in the city centre, between $20,000 to $30,000 for a lot, that there is little economic feasibility of expansion. Because expensive land can be put to a more profitable use, commercial offices or retail shops, rather than used for manufacturing, there is pressure for these factories to move away from the city centre. In some cases, particularly printing and clothing manufacturing, there are considerable advantages in being near to the downtown area. Printing, particularly, requires a location close to its customers who are largely from downtown offices. There is much to be gained for a clothing factory from a site near the main bus routes. Most of its employees tend to be women who travel by public transport rather than by car.

In the suburban areas there is a marked distinction between those areas which are dominated by manufacturing and those where manufacturing is only one of many industrial and wholesaling activities. The former are only represented by two examples, the petroleum and chemicals complex in Strathcona County and the meatpacking complex in the northeastern part of the city. Elsewhere in the city manufacturing is found interwoven with other activities either adjacent to railway lines or in the new industrial estates to the south and northwest. In all these areas

there is ample space available for expansion, even in the meatpacking area where operations started in the first decade of this century. Apart from the meatpacking zone the relative recency of most of Edmonton's manufacturing industry has allowed the avoidance of most of the problems now being encountered in the older manufacturing cities of eastern North America. Most of the industrial buildings are small and easily adapted to a variety of activities besides manufacturing. There are few obsolete factories and unoccupied buildings are not a problem in the older parts of the city. The small development of manufacturing in the city even today, and the very recent construction of most of the city, has reduced the problems facing manufacturing. Most problems are concerned with growth rather than the decay of the older parts of the city.

The Locational Role of Manufacturing

The connection of manufacturing in Edmonton with the local market has already been stressed. This is likely to remain the most important relationship in the future development of manufacturing in the city. Even the existence of local raw materials is a secondary consideration. The oil and gas resources which are the most significant of the local raw materials at present, are unable now directly to attract industry as they did in the early 1950s. It is too cheap and simple to ship the oil and gas by pipeline to the large consuming markets of Eastern Canada, especially southern Ontario. In September, 1962, for example, only 7.7 per cent of the oil produced in Alberta was refined or otherwise used in the province, the remainder was piped to markets outside the province. The prairie cities and Edmonton have increased their share of Canadian manufacturing in recent years but this has only been on a small scale and done nothing

to change the overall industrial dominance of Ontario and Quebec. In line with a similar movement of manufacturing to the west in the United States, which became most noticeable during the Second World War, the movement in Canada has been of great significance to western cities but has done little to erode the dominance of the "manufacturing belt" of the east.[2]

Edmonton shows a typical prairie emphasis in its industrial structure in the dominance of food and beverages and a relatively high proportion of activity in the petroleum products, non-metallic minerals, and printing and publishing industries.[3] The only variation from the structure found in the other western cities is the importance of the chemical industry. Unfortunately this industry appears unlikely to increase in importance in the future as the firms involved are not satisfied with their Edmonton location. They were attracted in response to factors, especially the availability of raw materials, which no longer apply and which seem, now, unlikely to reappear in the foreseeable future.

The isolation of Edmonton from the major concentrations of population and economic activity in Canada make it very difficult for a manufacturing firm in Edmonton to serve the national market. Transport costs are by no means the only factor in this situation, although the most important. There is a lack of industrial skills amongst the population and the long distances between the manufacturer and the potential customers are

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[2] A. J. Wright, "Recent Changes in the Concentration of Manufacturing," A.A.A.G., Vol. 35, No: 4, December, 1945, p. 164.

[3] D. W. Slater, "Trends in Industrial Locations in Canada", Resources for Tomorrow Conference, Background Papers, Vol. 1, Ottawa, 1961, p. 412.

disadvantages which were stressed by a number of businessmen. Here, as elsewhere away from the focus of the Canadian industrial economy in southern Ontario and Quebec, the emphasis must be on resource industries and manufacturing serving the local market. The latter, conversely, are protected by the long distance and isolation from the centre of manufacturing activity. The distance and transport costs give a regional protection to Edmonton's manufacturing.[4]

The rapid growth of Edmonton in every way and the attraction of manufacturing on a large scale for the first time, which the discovery of oil and gas at Leduc in 1947 began, has tended to obscure the traditional and basic functions of the city as a service centre. The manufacturing which has come to the city has served to supply the increasing market provided by the increasing population. There is only a little industry which can be said to have been attracted by the resources of the region. Despite the large investment in the oil and gas industry in Canada only a small proportion was within Alberta,[5] most of the remainder was in Eastern Canada. The major portion of the employment generated by the development of the oil and gas resources has been outside the province, particularly in Southern Ontario. There seems to be no reason, apart from a change in general economic policy, was why this should not be the result, too, of the development of the provinces other natural resources. The Royal Commission on the Metropolitan Growth of Calgary and Edmonton, 1956, in reference to the growth of both cities made the

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[4] G. Manners, "Regional Protection: A Factor in Economic Geography," Econ. Geogr., Vol. 38, No: 2, April, 1962, p. 129.

[5] In 1952 only forty-four million dollars out of $360 million invested in oil. Alberta, Royal Commission on the Metropolitan Development of Calgary and Edmonton, 1956, Chapter 10, p. 15.

following observation: "that as the natural resources of Alberta are further developed, urban growth will be stimulated most outside of the province."[6]

Conditions have not changed since the Royal Commission sat and the present work to increase the capacity of the Interprovincial Pipeline is an indication of the continuing trend to ship unprocessed raw materials out of the province. Other things being equal a market oriented location remains the most attractive for all manufacturing industry. Only those resources too expensive to ship out of the province in a raw state are likely to be even semi-processed in Alberta.

Only a complete change in the distribution of economic activity and population in Canada is likely to improve Edmonton's position as a location for manufacturing industry. Manufacturing will continue to expand here only as a result of population growth in the city and Northern Alberta generally. There is little that the city can do to improve this situation. Only minor improvements are possible to make Edmonton a more attractive location among its more immediate competitors, particularly Calgary.[7] Outside influences continually affect the attractions of the city for manufacturing. Now that the main east-west highway across Canada passes through Calgary, new manufacturing plants might find it more advantageous to establish in that city near the route rather than in Edmonton.

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[6] Ibid., p. 16.

[7] Largely the local services offered to industry power, water, provision of serviced sites and even buildings.

The Contributions of Manufacturing to the Total Geography

In a service city such as Edmonton the contribution of manufacturing to the total geography is only of moderate importance. Manufacturing, by means of its physical expression, only produces a distinctive character to restricted parts of the urban area. The most distinctive contributions of manufacturing to the areal variety of the urban area are in the petrochemical and meatpacking districts. In the other parts of the city factories are lost in a mass of residential, industrial and related buildings. The buildings housing manufacturing are generally small and not characteristically different from those of the surrounding service industries and warehouses. In the general urban pattern manufacturing activity is more notable by its unobtrusive nature rather than by more obvious contributions to the urban landscape. Only when the city is approached from the east do factories appear to the observer as a dominating feature, elsewhere they are lost in the general urban landscape.

The future growth of manufacturing seems unlikely to change the existing pattern of the industry in the city. The average factory will probably remain a small operation supplying primarily the local market. Large scale developments may similarly remain exceptional. The future growth of manufacturing will be assured if present trends in population increase continue, but only as an element of moderate importance in the general expansion of Alberta's economy, particularly in the northern half of the province.

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APPENDIX A

QUESTIONNAIRE ON INDUSTRIAL LOCATION

1. Name of Firm _____

2. Date of Establishment in Edmonton _____

3. Type of Industry _____

   Products _____

4. Number of employees (i) Male _____

   (ii) Female _____

5. Is your plant the branch, subsidiary or agent of a larger company operating either nationally and/or in the United States?

   _____

6. (a) What is the area of your industrial site? _____

   (b) How much of your site is used at present? _____

The remainder of the questionnaire deals with various location factors. If you feel other factors are of significance please comment to that effect.

7. Markets. Please specify the percentage of your products supplied to each area listed below:

   Northern Alberta (north of Red Deer) _____
   Alberta as a whole _____
   The West (Prairie Provs. & B.C.) _____
   National _____
   International _____
   Others, please specify _____

8. Raw materials. Please specify the percentage of your raw materials obtained from each area listed below:

   Northern Alberta _____
   Alberta as a whole _____
   The West _____
   National _____
   International _____
   Others, please specify _____

9. (a) Do you use the products of other Edmonton manufacturing industries? _____

   (b) If the products of local firms are used, please check proportion in total value of materials used on the list below:

(b) Less than 10% _____
10-24% _____
25-49% _____
50-74% _____
more than 75% _____

10. Please check which of the following factors influenced your location in Edmonton.

Proximity of Raw Materials _____
Market (a) as consumer _____
(b) as industrial _____
Labour Force (a) Skills _____
(b) Size _____
Transport Facilities _____
Availability of Fuel Supply
(a) Oil _____
(b) Gas _____
(c) Coal _____
(d) Electric Power _____
Supply of Water _____
If Others, please specify:

_____

Do you consider any of these factors difficult to obtain?

(please list)

11. Transport Costs. Would you consider transport costs in Edmonton as
(a) significant
(b) insignificant in Edmonton's position as an industrial centre
(please check which)

12. Are transportation costs important in the selling price of your product, please check proportion on the list below:

Less than 5% _____
5- 9% _____
10-19% _____
20-32% _____
more than 33% _____

13. Which form of transportation is of the greatest importance to your plant? (please check)
(a) rail _____
(b) Truck _____
(c) air transport of any significance? _____
(d) Is rail access necessary to the operation of your plant? _____

The next question is concerned with the geographical position of your plant within the city itself.

14. Why are you located in the position within the city you occupy? Please check the factors you feel significant in the list below:

(a) Adjacent to similar or complementary plants _____
(b) Suitability of land _____
(c) Access to highway _____
(d) Access to railway _____
(e) Access to gas or oil pipeline _____
(f) Influence of City Planning Regulations _____
(g) Low cost land _____

If you feel others are important, please specify:

_____

_____

15. Considering the knowledge you have of your industry, if you were relocating your firm would you do so:

(a) in Edmonton _____
(b) elsewhere in Alberta _____
(c) in some other western Province _____

If (b) or (c) Why? _____

_____

_____

APPENDIX B

RELATIONSHIP BETWEEN SEX OF EMPLOYEES, THE NUMBER OF CARS AND OTHER TRANSPORT FACILITIES, AT SELECTED FACTORIES

Factory	Number of Male Workers	Number of Female Workers	Cars per 10[1] Workers	Other Transport Facilities
Great West Garment	56	644	0.9	'bus route, chartered 'buses
Canada Packers	740	110	7.0	'bus route
N. W. Industries	329	59	u.k.	chartered 'buses
Inland Cement[3]	150		6.7	transport for secretarial staff
Bohemian Maid[2]	50	7	8.8	-
Reynolds Mfg.	8	42	1.4	'bus route
Dominion Bridge	434	31	4.3	'bus route
Canadian Chemical Co.[3]	850		3.8	chartered 'buses

[1] Only approximate figures in every case.

[2] This factory is one-third of a mile from the nearest 'bus route.

[3] These factories are outside the area served by the Edmonton Transit system.

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